JULY 17, 1937

ELECTRICAL WORLD

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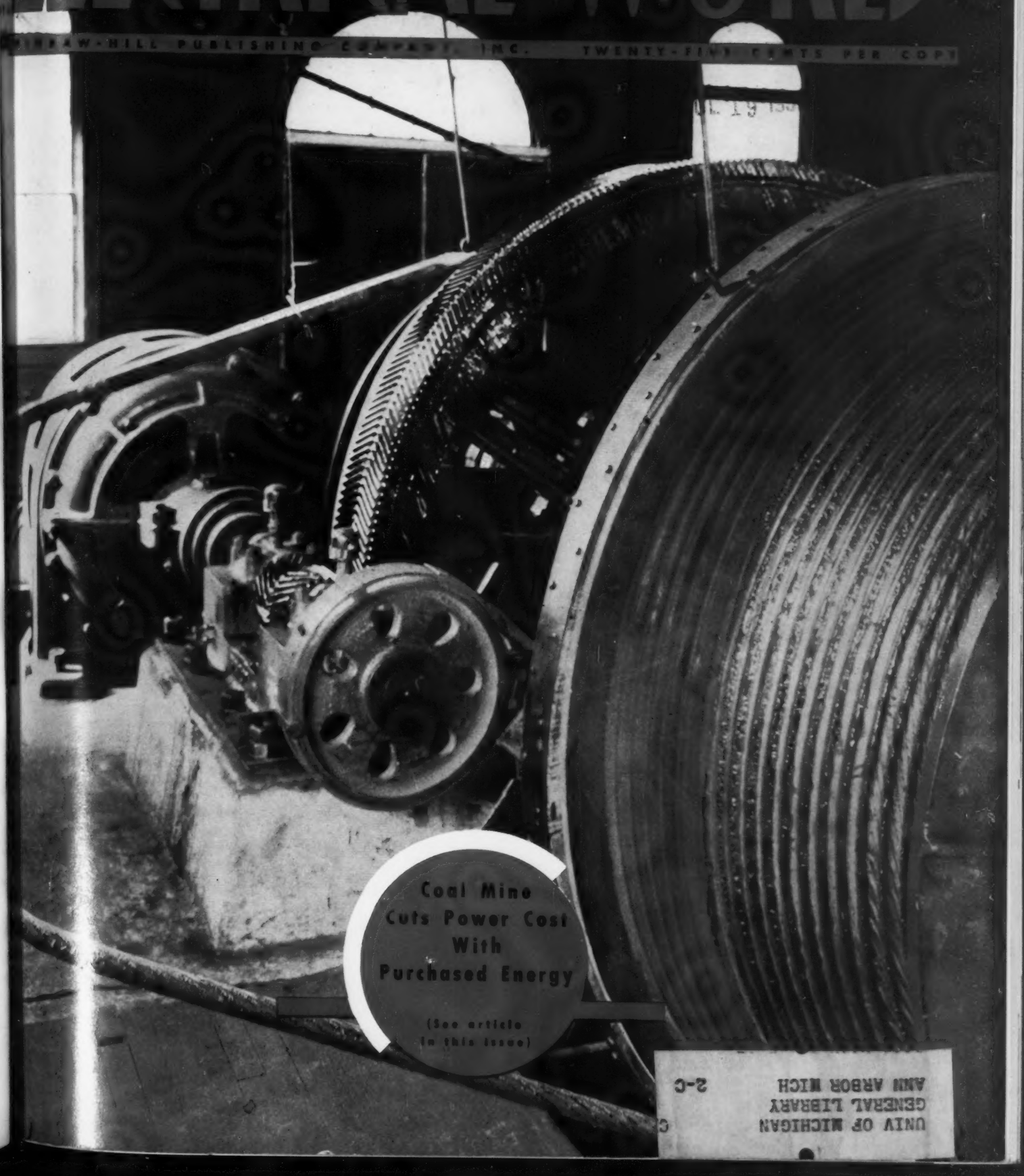

Coal Mine Cuts Power Cost With Purchased Energy

(See article in this issue)

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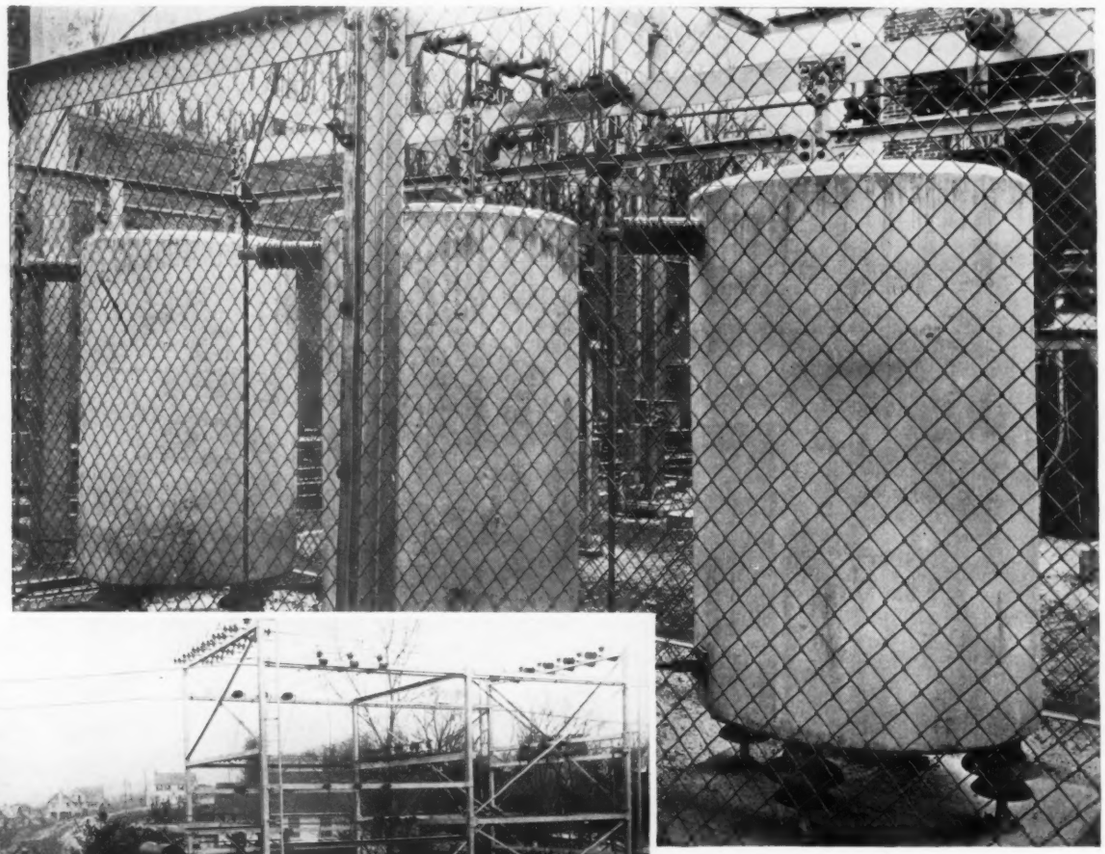

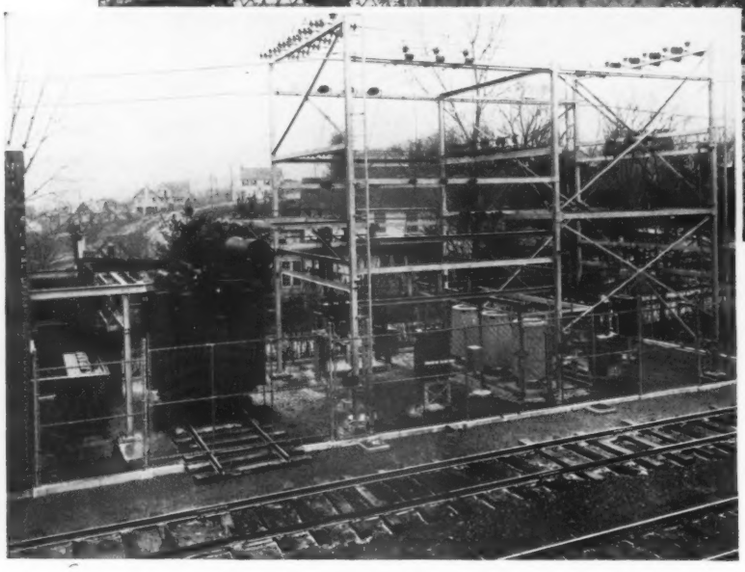

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Coming Features

Operating Experience With Superposition

In its eight years experience with an installation of a pair of high-pressure boilers and a superposed turbo-generator, the Kansas City Power & Light Company learned a number of lessons in pulverizers, waterwalls, superheaters, economizers, blading scale and deslagging. An article scheduled for July 31 will tell what they were.

That Home-Town Contest

For the first time the complete story of Georgia Power Company's state-wide sales campaign is told in a feature article scheduled to appear in ELECTRICAL WORLD for July 31.

Building Load With Lighting

Twenty-five billion kilowatt-hours will be consumed in burning out the incandescent lamps produced in 1936. As a profitable load, lighting offers many opportunities in home, store, factory, farm and highway. See special insert in July 31 issue for analysis of these opportunities with case studies.

On the Cover

This 250-hp. slip-ring motor, driving the coal hoist in the Lake Superior Coal Company's mine No. 1 at Superior, West Va., replaced twin steam engines of 900 hp. capacity.

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Contents Copyrighted, 1937, by McGraw-Hill Publishing Company, Inc.

ELECTRICAL WORLD—Published weekly. Price 25 cents a copy. Subscription rates: In the United States, Canada, Mexico, Central and South American countries, $4 a year; all other countries, $6 or 24 shillings a year. Entered as second-class matter November 16, 1936, at Post Office at Albany, N. Y., under the Act of March 3, 1879. Printed in U. S. A.

Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

McGRAW-HILL PUBLISHING COMPANY, INC.

Publication Office: **99-129 North Broadway, Albany, N. Y.**

Editorial and Executive Offices: **330 W. 42d Street, New York, N. Y.**

JAMES H. McGRAW, JR., President — HOWARD EHRLICH, Executive Vice-President — JAMES H. McGRAW, Honorary Chairman

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ELECTRICAL WORLD

JULY 17, 1937

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Power Advertising Possibilities

About a year ago a group of power sales engineers operating in the Great Lakes region, sensing an increasing competition to purchased power, proposed that national advertising be employed to promote the advantages of utility service to industrial and commercial customers. Power sales groups in other parts of the country have been quick to lend encouragement to the proposal, with the result that a national committee, as explained elsewhere in this issue, is now endeavoring to secure sufficient commitments to the program to enable a co-operative advertising campaign to get under way in the near future.

Sponsors of the proposed campaign are opposed to anything that might be construed as propaganda. They state without equivocation that the only purpose of the advertising is to sell the value of central station power service. This will not be difficult to carry out provided the copy is always written to publicize the positive values of purchased power. In fact, there are so many technical and economic reasons for the use of utility service, and so many more would arise during such a campaign, that there should never be any room for anything else.

From the standpoint of cost to the contributing companies the price is very small, but the benefits that accrue can be great:

1. The power sales force of most, if not all, of the companies can never be fully adequate to maintain frequent personal contact with all of the power customers and, therefore, some additional selling tool like advertising is needed to bolster up the work of the individual salesmen and to keep customers satisfied with utility service.

2. A national advertising campaign will bring a greater uniformity of sales approach all over the country. The value of this might not be apparent until it is remembered that competitive power sold in any territory extends its influence in every direction.

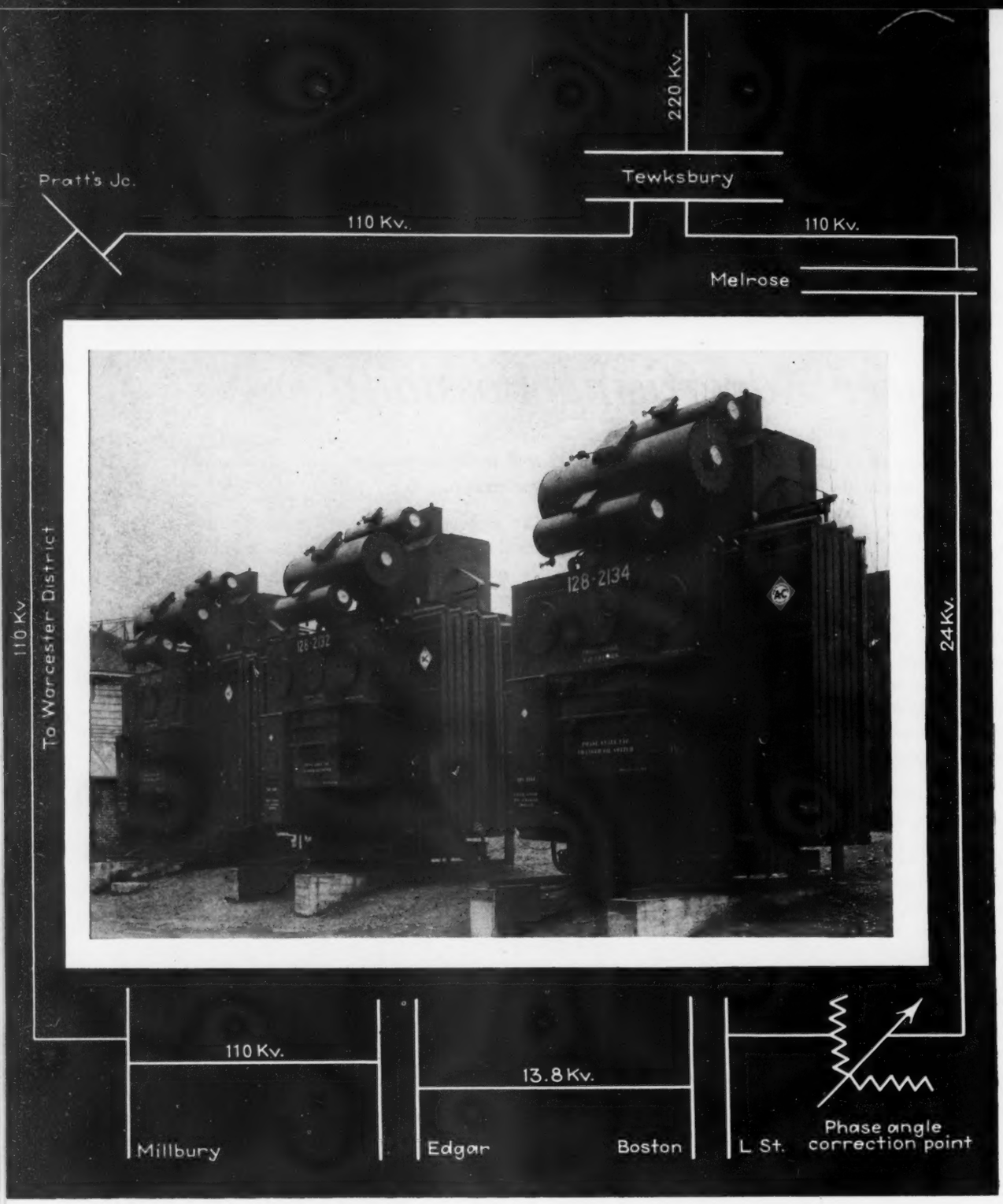
3. To conduct a strong local advertising and promotional campaign to power users would be fairly expensive, whereas a national campaign in media with heavy concentration in industrial circulation can do a very effective job for a comparatively small amount per contributor.

4. Too few utilities have taken the trouble factually to appraise the value of purchased power to the user. A national campaign would require that these facts be determined. From them might come a new technique in power selling.

5. The very fact that there is a campaign and a national committee will result in more attention being given to power sales, from which can easily come a greater acceleration of the development of the power market.

Other industries have engaged in co-operative advertising with results that are too well known to be here detailed. This much is to be said, however, that where such campaigns have been intelligently conceived there has come a new industry solidarity and a stronger sales approach on the part of the individual units. There is more incentive for a competitive sales problem of one company to become a problem for group study.

It took the gas industry several years to see the advantage of co-operative advertising, during which time competitive fuels and services made deep inroads into the business. The electric utilities might well heed that lesson and through this proposed national advertising both protect a market that they have been years in building, and to serve which they have a large investment, and so strengthen their sales approach as to make the power market even more productive.



REGULATING TRANSFORMERS CLOSE LOOP

Operation of a closed transmission loop from the Edgar station of the Boston Edison Company through its L Street plant and the New England Power Company system back to Edgar via Millbury was recently established by the installation of three in-phase and quadrature regulating transformers at L Street. Each unit, rated at 250 amp. at 24 kv., is cut into a cable tying L Street into the New England system at Malden and Revere, whence circuits extend through Melrose, Tewksbury, Pratt's Junction and Millbury to Edgar, which is connected to L Street by underground ties. These units have a 40 per cent in-phase voltage range, a 50-deg. quadrature range and tap changing under load. Hitherto it has been impracticable to close the connection between L Street and Tewksbury because of phase-angle conditions.

Mine Buys Its Power and Sells Its Coal

Averts a Heavy Capital Outlay for New Power Facilities, Lower Operating Cost

By F. O. HARRIS . . . B. C. HYLTON
Vice-President and General Manager — General Superintendent
Lake Superior Coal Company, Superior, W. Va.

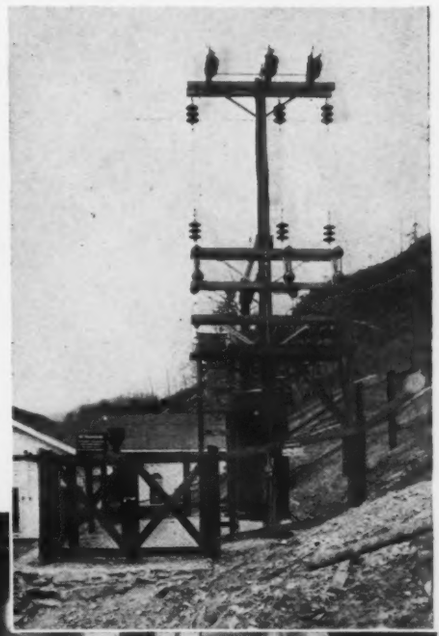
In the Pocahontas field, served by Appalachian Electric Power Company's Bluefield, W. Va., division, 80 per cent of the coal is mined with purchased power. In power magnitude 90 per cent is electrified. This, of course, is no accident, but rather the consequence of economic advantage in buying power rather than using mined fuel to generate it. Uniquely among power users, coal mines have mined "coal to burn." That, therefore, they should let the utility company make the power they use is a result of such analyses as the one here presented. In this one district about 80,000,000 kw.-hr. were delivered in 1936 to mines which produced some 30,000,000 tons of coal.

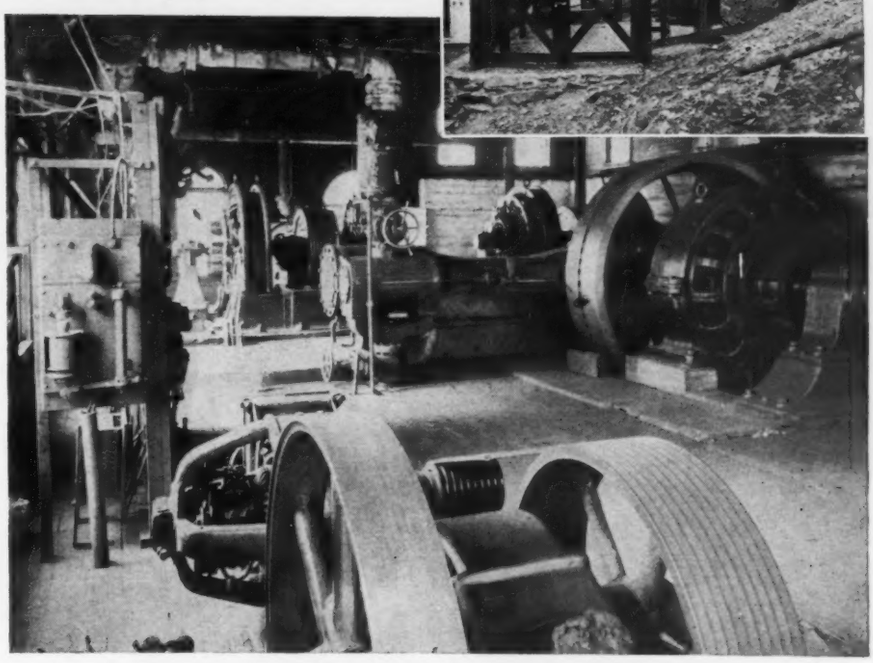
THE Lake Superior Coal Company operates two shaft mines located at Superior, McDowell County, W. Va. The plant is situated on the main line of the Norfolk & Western Railway Company, approximately 3 miles east of Welch.

It began operating in the year 1907 and has shipped to date nearly 6,500,000 tons of coal. No. 1 mine operates in the Pocahontas No. 3 seam, which lies 250 ft. below the surface, and No. 2 mine in the Pocahontas No. 4 seam, 160 ft. below the surface. Previous to the year 1928 all power used was furnished by the company-operated steam plant. During that year inadequate power supply necessitated purchasing a portion of the requirement. Two 200-kw. motor-generator sets were installed for supplying 275 volts d.c. which operated the underground electric system at No. 2 mine.

Increasing operating expense of the steam plant prompted an investigation in order to determine the advisability of either installing a modern steam plant or purchasing all power. After extensive surveys were made it was decided that the most economical step would be to electrify all steam-driven equipment and purchase power. The investigation disclosed that a modern steam plant would cost approximately $165,000.

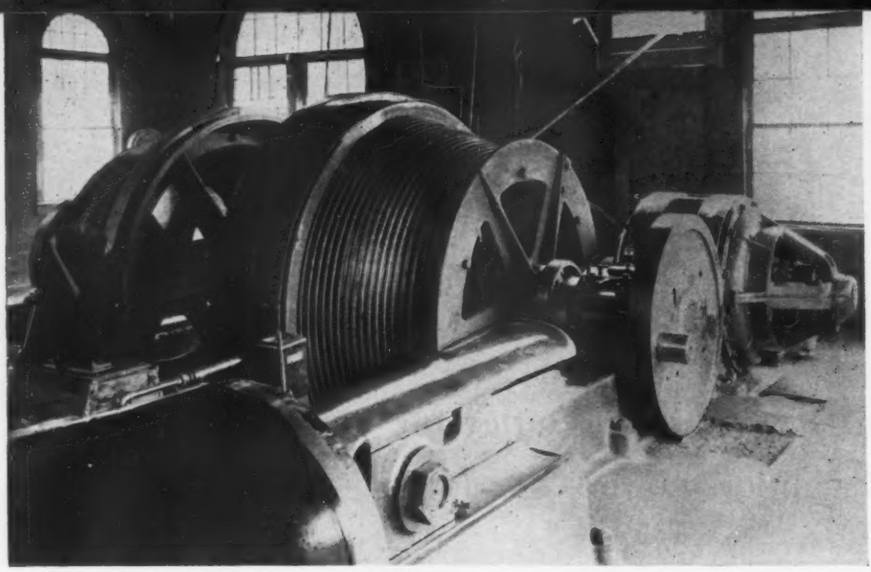
The change from steam to all-electric-



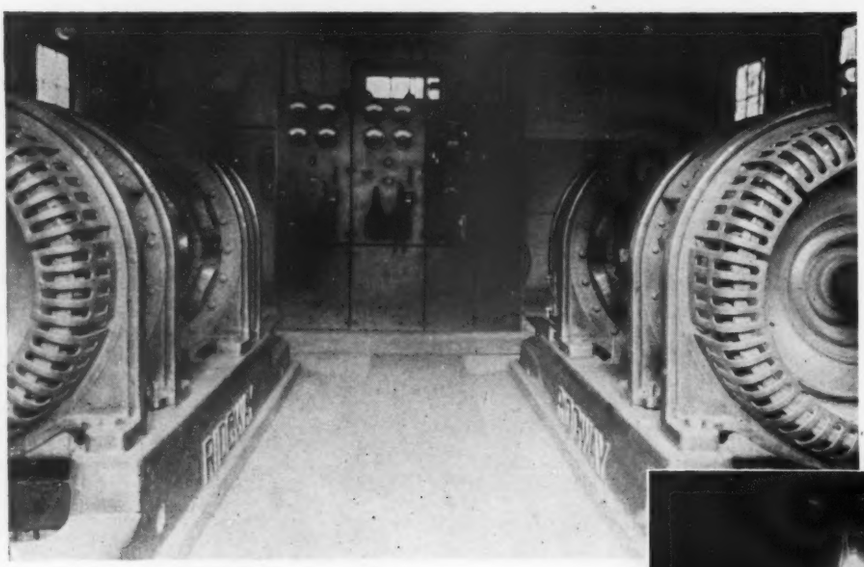


Substation serves both mines of Lake Superior Coal Company

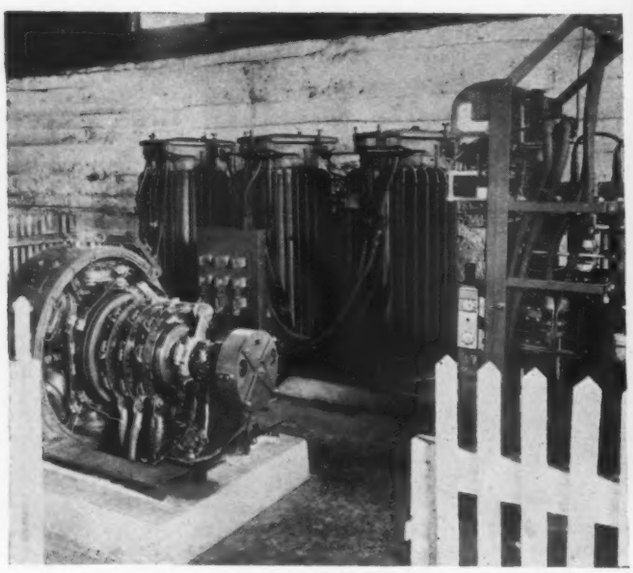
Above—Appalachian Electric Power Company has installed 1,000-kva. service at 13,200 volts stepped down to 2,300 volts for mine power. Below—Steam-driven generators now idle.



Mine hoist (No. 1 mine) now driven by 250-hp. slip-ring motor. The No. 2 installation is practically identical



Two 200-kw., 275-volt motor-generator sets supply d.c. power to distribution system at No. 2 mine



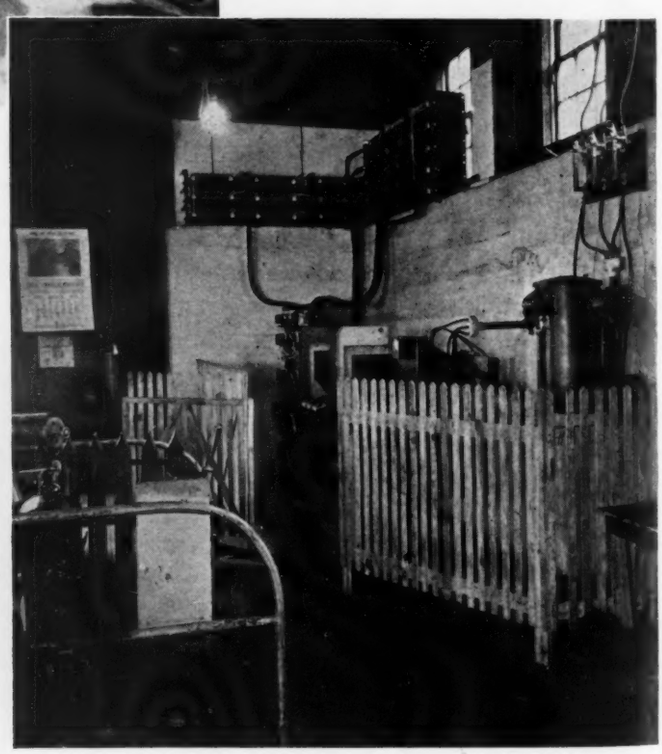
No. 1 mine now supplied power from 300-kw. synchronous converter

driven equipment entailed an expenditure of approximately $33,000. The greater proportion of this amount would have been expended if a modern steam plant had been provided. Avoiding the outlay of capital necessary to replace old steam-driven generators, which were nearing the end of their useful life, was a large factor influencing the decision to purchase all power requirements. Other advantages expected from the use of purchased power were that the power company affords better regulation of voltage and a much more dependable source of power than would have been attainable from a local electric plant.

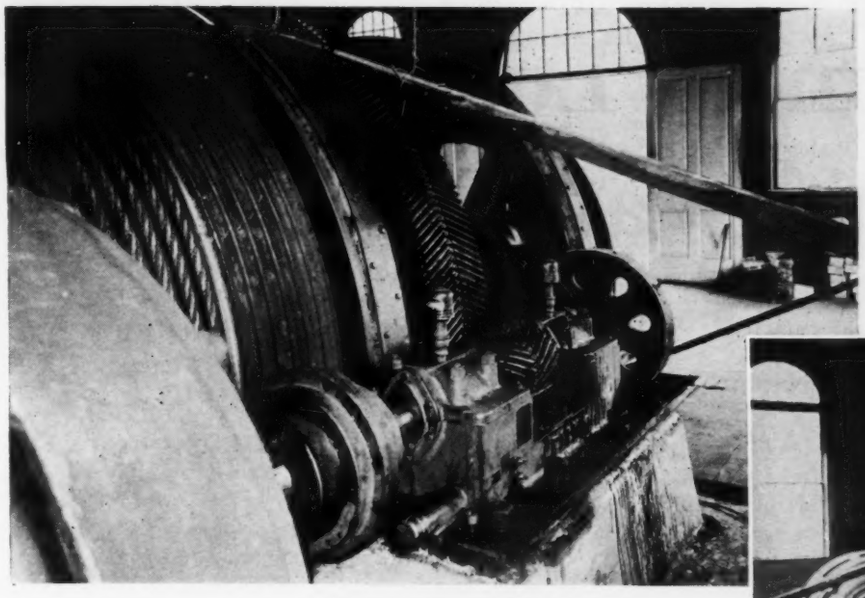
Installation of the electric equipment was completed during the latter part of the year 1936 and consists of the following:

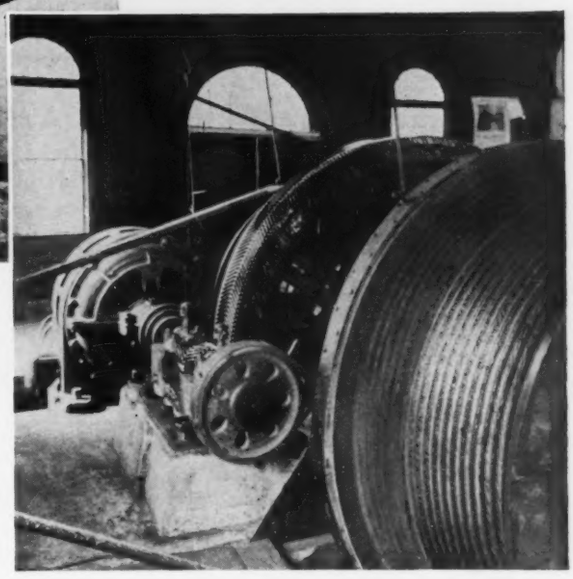
No. 1 Mine — A 300-kw., 6-phase rotary converter delivering 275 volts direct current to the underground distribution system, this converter being started manually with automatic reclosing circuit breaker on the d.c. side.

Coal Hoist—250-hp., 2,300-volt, 450-r.p.m., slip-ring induction motor controlled by a drum-operated controller and connected by flexible coupling to a herringbone pinion. A split gear



Picket inclosure houses No. 1 mine hoist control equipment
Rotor resistors on window ledge, automatic panel at the far end, air-break 2,300-volt primary reversing contactors (with arc chutes) adjoining and control transformer at the right. The hoist operator stands at controller mounted on pedestal in left foreground.





Motor drives hoist through herring-bone gearing

Two views of the No. 1 hoist. Gears are 9-ft. diameter with 268 teeth for the gear and 23 teeth for the pinion. The auxiliary emergency brake is mounted on the pinion shaft extension. Both views were taken during or immediately after construction, before clean-up period. Gearing has since been housed.

9 ft. in diameter is mounted on the hoist shaft between drums.

A 100-hp., 2,300-volt, 720-r.p.m., squirrel-cage induction motor connected to a centrifugal fan supplying ventilation. Power is transmitted to the fan by means of V-belts.

Two 10-hp., 220-volt, 1,750-r.p.m. motor pumps operated by full automatic control for supplying 100 or 200 gallons per minute to the domestic water system.

No. 2 Mine—Hoist motor same as at No. 1 mine except 200-hp. capacity. A centrifugal fan temporarily driven by a 50-hp., 250-volt direct-current motor connected with V-belts. This fan will be equipped with an a.c. motor in the near future.

Tipple equipment is driven by several 440-volt motors totalizing 60 hp.

Each mine hoist was previously driven by twin engines of 900 hp. capacity, operating 6 x 8-ft. double conical drums. The hoists were converted to electric drive as shown in detail in the accompanying illustration. It will be seen that the motor drives and controls were added with a minimum of disturbance to the existing arrangement of foundations and hoist drums. The motor resistance is cut out in seven steps by the drum-operated controller, giving smooth acceleration in hoisting operation.

Photographs were taken during or immediately after construction, before clean-up period, so as to show details.

Previous to the change hoist brakes were applied by means of a steam cylinder. The present braking is accomplished by means of weights suitably connected to the brake bands. Brakes are released by the application of air supplied by a 5½-cu.ft. motor-operated compressor.

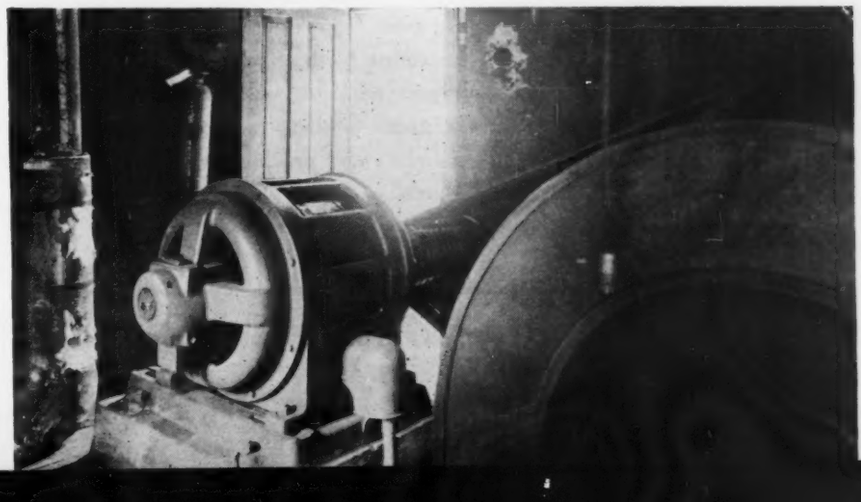
In case of emergency, such as overtravel, power failure, etc., a magnetic air-release valve is actuated by means of auxiliary contacts, thus insuring a positive application of brakes irrespective of operator's action.

Under present powering the hoists are capable of handling 50 per cent more coal than tipple capacity. Steam hoist operators have been found to respond readily to training in the manipulation of the electric controls on the hoists, quickly becoming proficient, thereby eliminating most of the jerky movement that is characteristic of much conventional steam-operated hoisting. No change was found necessary in the signal scheme used when hoists were operated by steam.

At present these mines are producing approximately 2,000 tons per day. Available reserve of 19,000,000 tons will sustain operations for about 40 years.

Power costs one-fifth less

Sufficient time has not elapsed since changes were made to make accurate comparative cost figures in so far as maintenance of equipment is concerned; however, the total cost of power has been reduced materially, this reduction amounting to approximately 22 per cent. Increased efficiency in machinery, especially that underground, has greatly improved operating conditions in general, which is highly acceptable to the management.



Fan motor for No. 1 mine is 100 hp. with V-belt drive. Old crank disk and steam piping not removed

Management Looks at the Electric Water Heater

The Search for Added Net Earnings Leads to Intensive Development of Water Heating Load — Operating Characteristics Affecting Utilities Are Analyzed

By K. M. ROBINSON
President and General Manager Idaho Power Company

THERE are demands pressing upon the utility industry from four different directions, and they must be met. I am going to take our own company as the example for these four demands, for I can draw them most effectively from our own experiences in Idaho.

First—The taxing bodies—federal, state and local—are all increasing their demands upon our revenues in order to finance the mounting costs of government. The Idaho Power Company has the doubtful honor of being the highest-taxed electric utility in the United States. Last year we paid out in taxes 22 cents from every dollar of revenue received, and from all indications our total tax bill alone will be increased by something like $100,000 in 1937 over 1936. That's important money in any utility business.

Second—We have a responsibility to our employees in seeing that wages keep pace with the mounting cost of living. The trend of living costs is no different in the mountains and on the farms of Idaho than anywhere else in the United States. It is definitely on the upgrade. In everything we do—whether selling service and merchandise or operating the property—we need the undivided loyalty of our employees, and we cannot expect that loyalty unless we keep faith with them.

Third—We have a just and proper demand from our security owners that we protect their investment in our property and continue to earn and pay adequate interest and dividends.

Fourth—We have a constant demand from our customers for continued reductions in electric rates. In Idaho we have made twenty rate reductions since 1927, aggregating about $400,000 per year. If we are to continue to keep public good will, we must pass on to our customers every possible saving in the form of reduced rates.

So we are in a vise, with one jaw made of increased expense—especially in wages and taxes—and the other of reduced revenues as rates are further reduced.

The answer? Increased revenues, of course.

No mere tabulation of appliances sold nor of merchandise sales is this story revolving about the water heater. Instead it is a forthright presentation of the practical way in which an alert management is facing a current utility problem and solving it successfully under circumstances which are today operating upon many utility companies. Concisely presented, the story is nevertheless a broad survey of present conditions and of those related basic factors which must receive increasing executive attention over the next few years. Used as a tool by the operating executive, the water heater has been found to be productive of increased revenue without material additional capital investment, for electric water heating service is subject to unusual flexibility of control. As the product is now being manufactured with a high degree of efficiency and dependability, the utility escapes the service problem.

The way to build load quickly

With our electric cooking saturation up to 47 per cent and refrigeration almost equally high, there is only one domestic use left for us to sell that will build load quickly, and that is water heating.

From May 1, 1935, to the end of 1936 we sold more than 3,800 electric water heating installations, producing a use of 10,000,000 kw.-hr. per year, which brought in an added gross revenue of $120,000, a large portion of which was available to help meet increased expenses and necessary rate reductions. In short, we have gone out to get 1940 earnings on our 1936 and 1937 income statement in order to

meet some of those demands I spoke of at the start of this article.

In 1936 we sold 2,500 water heater installations to our average of less than 42,000 domestic customers, or one water heater to every seventeen customers. Each of those installations will sell from 2,000 to 3,000 kw.-hr. of energy per year for us, and it is the only domestic use I know that will sell that volume.

But we did not build up to that 1936 volume by putting in a water heating rate and hoping that our customers would hear about it and come into our stores to buy heaters.

We began a few years ago by selling factory-built water heater installations to our own employees. You cannot sell a new and comparatively unknown service to your customers unless your own organization is sold on it up to the hilt. And let me add, parenthetically, that if every electric company would sell electric water heating to its own officials and department heads alone, you would see a bulge in water heater sales in two or three years that would be astonishing.

We started educating the electric dealers in our territory to use and sell water heaters, right from the start, and you cannot carry out any merchandising load-building program successfully unless you bring the electric dealer right along with you. As a result, while the total sales of water heaters are increasing each year, the share of dealers' sales to the total is increasing at an even faster pace, and it will not be long before dealers' sales will have far outstripped the company unit sales, which is a very healthy condition.

Dealer activities stimulated

We do everything we can to stimulate this dealers' activity. We help in the formation of dealers' associations. We spend nearly half of our advertising appropriation in advertising that is signed by the dealers' association and make no reference whatever to the Idaho Power Company. This advertising stresses the use of electric appliances and urges the reader to patronize his local electric appliance dealer.

One of the most successful methods in dealer co-operation for us has been the policy of holding training schools for dealers' salesmen to teach them everything we have learned about appliance selling, and when I say this has been successful, I mean from the dealers' point of view as well. Among other things, we school these men in our promotional rates and teach them how to use such rates as a selling weapon. This is highly important, of course, in the selling of water heaters where you have, as we do, an all-service single-meter rate for water heating customers, which in most instances brings their billing for water heating use to slightly above one cent per kilowatt-hour.

Customer places value on convenience

As part of our policy of always giving the local retail dealer a "break," we ask for—and get—full list price for all appliances, and full installation cost as well. And I might add that when the Idaho Power Company offers any form of special inducement, such as a trade-in allowance on ranges, we first make absolutely certain that the dealer is able to make the same offer at the same retail price without making it burdensome for him.

There is another bugaboo that we have buried, too, in Idaho, and that is the notion that the customer will shy off at the price of a water heater. It takes only one comparison to prove my point: In our territory, fuel oil for house heating costs 50 per cent more than coal, yet 75 per cent of the heating systems installed in the last two years are automatic oil heat. If a customer will pay $150 a year for fuel oil, when $100 worth of coal will do the job, there is just one reason—the convenience of automatic equipment.

And that's the selling argument that will wipe the question of price out of the customer's mind—on water heaters just as easily as on house heating.

Space does not permit a discussion here of carrier current control, the salient features of which have already been published in ELECTRICAL WORLD. To answer one question asked many times, we disconnect the water heaters for about one hour at noon and again for an hour or so in the evening, at the time of our two daily peaks.

We now enjoy a water heating saturation of about 18 per cent. This is nearly double the saturation of three years ago, when we served many less customers. This compares, for example, with a range saturation of 47 per cent. Our average annual kilowatt-hour consumption for residential use is more than 1,400 kw.-hr. and our rural domestic customers average about 1,900 kw.-hr.

To complete the picture, let me close with a few facts about our property. Our handicaps are about the only things that are unusual. Our property is scattered across southern Idaho and eastern Oregon; it measures 425 miles from one extremity to the other, and the largest town we have is Boise, with a population of 22,000. Between our towns are large areas of sagebrush desert, and we average less than twelve customers per mile of total transmission and distribution line. An Eastern utility advertising man who drove 300 miles from Boise to Pocatello with our commercial manager last summer wanted to know at the end of the trip if we counted the jackrabbits out on the desert to make up our total of 48,000 customers.

The Author

Some 26 years ago K. M. Robinson, president and general manager of the Idaho Power Company, entered its service by way of a predecessor organization, Idaho-Oregon Light & Power Company. Starting as a teamster on construction work, Mr. Robinson held practically every outside job in the business and then became successively local manager at Parma, division engineer and division manager at Payette. Step by step he advanced to assistant general manager, to the vice-presidency and in 1934 achieved his present position.

Water Rheostat Loads 82,500-

Three 6-In. Pipes at 20-Ft. Spacing in Tailrace Afford a Test Load for Large Hydro Alternator at Boulder Dam

INSTALLATION of the large generators at the Boulder power plant necessitated corresponding proportions in the design of all related equipment, and this was equally applicable to the apparatus for testing purposes.

The problem of providing a sufficient load for purpose of testing the generators called for a variable load capable of absorbing the output of one of the 82,500-kva., 16,500-volt generators.

The load could be obtained by use of a commercial load or some artificial load; *i.e.*, a water rheostat. However, the use of a commercial load for testing purposes was discarded because it would result in serious disturbances on the power system, due to frequent changes in the load during the tests. Investigation indicated a water rheostat of enlarged proportions would be an economical and satisfactory energy-consuming device.

A review of available data covering water rheostats was made and information concerning their design was found to be limited, regardless of the fact that they have often been used in power plant tests. The bibliography given herewith shows the limited extent of the data. Apparently in the past the rheostats were built largely by the "cut-and-try" method.

The most suitable type of rheostat for the purpose was found to be one consisting of three cylindrical electrodes insulated and suspended from corners of an equilateral triangular frame. This type of apparatus, while energized, could be lowered and raised in the tailrace by means of a derrick, thus making it possible to vary the load.

Resistance formula available

The principle of the water rheostat is based on the dissipation of electrical energy into the water in the form of heat, this being generated in the resistance of the water between the electrodes. The total resistance is a function of the specific resistance of the water and the spacing of the electrodes.

Resistance for a given load can be determined from the following equations:*

$$R = \frac{\rho}{2.73\ l} \log_{10} \frac{(2D)}{(\ d)}$$

where:

R = resistance between the electrode and neutral in ohms per inch cube.
ρ = resistivity of water in ohms per inch cube.
l = depth of immersion of the electrode in inches.
D = spacing of the electrodes, center to center in inches.
d = external diameter of the electrodes in inches.

Although extremely varying conclusions have been reached by various authors concerning the current density permissible for determining the minimum amount of electrode surface, conservative designers recommend operation at a value of 2 to 3 amp. per square inch. Above this limit, disturbances, indicated by spitting, arcing and flashing at the electrodes, make the operation of the rheostat unstable and subject to short circuit. However, in the laboratory observations have been made with current densities as high as 32 amp. per

* See bibliography, item 6, page 46.

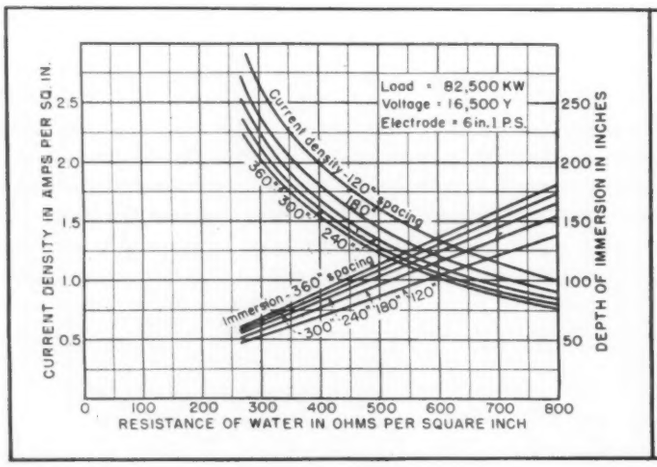


Fig. 1—Relative effect of electrode diameter on current density and immersion

With respect to water resistance. Spacing constant at 240 in. The current density below 2 amp. per square inch for the range of water resistance of 350 to 550 ohms per inch cube could be obtained by using a 6-inch. I.P.S. (iron pipe size) electrode, while further increase in electrode diameter reduced the current density at a diminishing rate.

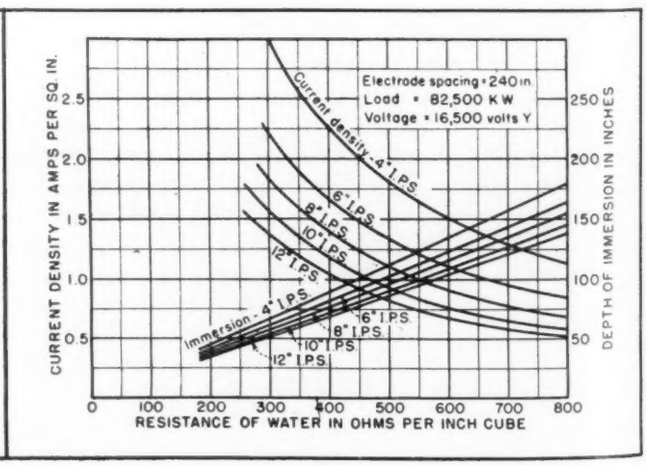


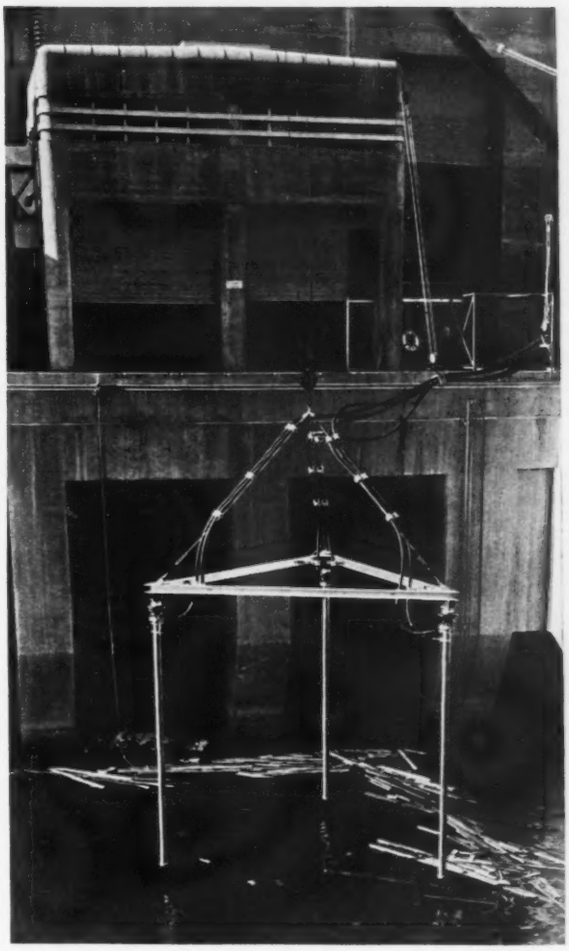
Fig. 2—Electrode spacing is related to immersion and current density

With respect to water resistance. Electrode diameter constant.

Kva. Generator

By T. W. MERMEL

Electrical Engineering Design Section,
U. S. Bureau of Reclamation,
Denver, Colo.



square inch, without disturbing phenomena.

The relationship between the current density and the other influencing factors for this type of design can be readily determined from the following equation (6):

$$D = \frac{d}{2} \log^{-1}_{10} \frac{(0.869\ v)}{(\rho\ d\ \sigma)}$$

where:
σ = current density in amperes per square inch.
v = voltage to neutral,
the other notations being the same as in the previous equation.

The above equations have the same limitations found in computing the electrostatic capacity between cylinders and are of the same general type.

Water resistivity determined

The water in the tailrace at Boulder power plant was tested over a period of time to determine the seasonal variation of resistance, and this was found to vary from approximately 350 to 550 ohms per inch cube. These values were obtained by measuring the resistance of isolated columns of water between two disk electrodes. The columns were from 8 to 30 in. in length, using 250 volts a.c., and were tested in a glazed tile pipe. Alternating current was used in order to eliminate polarization effect.

Due to the ample supply of water in the tailrace, the temperature rise and its effect upon the resistance of the water was not taken into consideration; however, this factor should be carefully studied where only a limited supply of water is available. Under such conditions the temperature rise will have a marked effect on the conductivity of the water.

Hundred inch minimum immersion

A series of computations were made to show the relationship between spacing and electrode diameter and its effect on immersion and current density. It was considered desirable that an immersion of at least one hundred inches should be used when carrying full load, so that any wave action causing variation in the depth of immersion would create but a small change in the effective resistance. During actual operation the load held remarkably steady, even though the water level in the tailrace varied as much as 15 in. due to surges caused by needle valve discharge a short distance downstream.

It is evident from the curves in Figs. 1 and 2 that the increase in spacing has less effect upon the reduction of current density than the change in electrode diameter. However, it can be seen from Fig. 1 that increasing the electrode diameter causes a decrease in immersion, whereas an increase in spacing of electrodes, indicated in Fig. 2, results in an increase in immersion. From the curves shown it can be seen that the two following conditions occur:

1. Increase in electrode diameter decreases both the current density and the depth of immersion.
2. Increase in spacing of the electrodes decreases the current density but increases the depth of immersion.

The above are analogous to the basic principles of the electrostatic theory.

With these characteristics in mind. the proper selection of spacing and electrode diameter can be made so as to obtain the required immersion and current density for any particular combination of conditions.

Since the water rheostat is to be a permanent part of the testing facilities at the Boulder power plant, for use with all units to be installed in the future, the rheostat was made using a 6-in. H-beam triangular frame, all parts of which were galvanized, giving a center-to-center spacing of electrodes of 240 in.

High-voltage, post-type insulators having a high cantilever strength were used to insure against breakage caused by the force of the rapidly flowing water against the submerged parts of the electrodes.

Will absorb full load

During the initial tests, prior to the placing of the units in regular service, each unit was tested individually for the operation of the governor, relief valve and overspeed. Due to the present low level of the reservoir the generator capacity at full gate opening was limited to 56,000 kw. at generator voltage, this being the maximum load carried by the rheostat to date. When final acceptance tests are made the water rheostat will carry 82,500 kw. at 16,500 volts. The water rheostat has four 1,500,000-circ.mil cables connecting each electrode to the transfer bus of the power plant. At present two cables per phase are sufficient

for the reduced output of a machine.

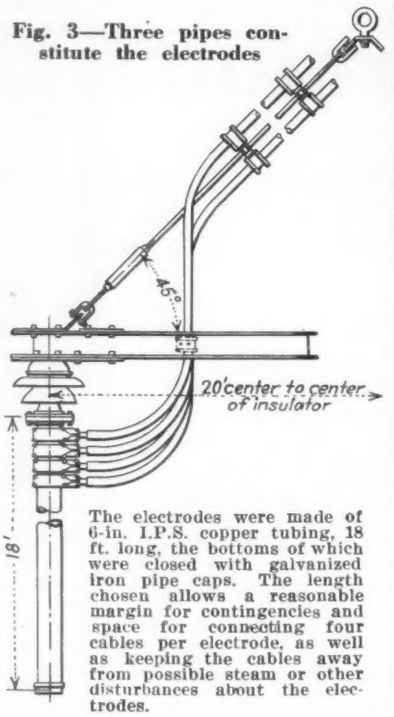
Although the temperature of the water in the vicinity of the rheostat was not recorded during the periods when 56,000 kw. was being dissipated, steam vapor could be seen rising near the electrodes. Occasionally during the tests, near peak loads, flashing accompanied by loud reports occurred at the ends of the electrodes. This was believed due to the rise in temperature of the water and the fringing of current at high densities, as it would occur only when a small whirlpool centered around the rheostat and the water would remain comparatively stationary for a short period of time. However, the instant that the whirlpool moved away from the rheostat and fresh water flowed past the electrodes the flashing ceased. When the rheostat was energized by closing the generator oil circuit breaker at rated voltage small gas bubbles would rise from the electrode surface, but would cease almost instantly. Lumber floating in the tailrace would cause spitting and arcing upon coming in contact with the electrodes.

Performance confirms computations

Actual operation of the rheostat indicated that the computations were confirmed, in so far as the practical sense of the word applies, and that the theory can be utilized in the design of water rheostats. However, liberal allowance must be made for the reduction in resistance of the water due to the rise in temperature while the rheostat is under load. Although the resistance of the water was approximately 525 ohms per inch cube at 25 deg. C., the resistance was reduced substantially due to temperature rise. Since the rheostat was designed for the limits from 350 to 550 ohms per inch cube no difficulties were experienced. The curves of Figs. 1 and 2 show that the current density, which becomes the disturbing factor above 2 to 3 amp., rises rapidly as the resistance of the water decreases.

Besides the 82,500-kw. rheostat a smaller one was also built for the purpose of testing the 3,000-kva., 2,400-volt station service units. Based on the same principles, the rheostat was made of three 1-in. galvanized iron pipe electrodes capped at the ends and spaced equally at 6-ft. centers. This rheostat also confirmed the theory within practical limits.

Fig. 3—Three pipes constitute the electrodes



The electrodes were made of 6-in. I.P.S. copper tubing, 18 ft. long, the bottoms of which were closed with galvanized iron pipe caps. The length chosen allows a reasonable margin for contingencies and space for connecting four cables per electrode, as well as keeping the cables away from possible steam or other disturbances about the electrodes.

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Water Heating Equipment as Needed

From an address by Harris E. Dexter, general manager Central Hudson Gas & Electric Corporation, over Station WGY under the auspices of General Electric's Rural Electrification Section

"Electricity is very flexible and should not be used just to replace fuels in heating water. It should be used to give you the hot water service your particular home needs, where you need it, and when you need it. Automatic hot water probably means more to the woman in the kitchen than anywhere else. She needs a cup of hot water for this, a quart of hot water for this, that and the other thing frequently during the day. She can get this by purchasing a small 1-gal. heater for $28. Install this little automatic heater directly underneath the sink and it will give a completely automatic kitchen hot water service for less than 2 kw.-hr. per day. Just think of it! At a rate of 1½ cents per kilowatt-hour, this is only the price of a postage stamp each day for a complete hot water service for the kitchen. For the laundry and bath, why not install a 10-gal. electric water heater in the basement, with a switch located in the kitchen, so that you can turn it on and off at will as you need hot water for either laundry work or bath? With an arrangement of this kind you can make your hot water service cost anything you like. For example, in a family of two adults and two children the bath and laundry can be supplied with this type of hot water service for about 150 kw.-hr. per month, which, at the rate of 1½ cents, would amount to only $2.25 per month if the family is conservative."

Engineers Need Mouthpiece on Public Questions

Engagement of Government with Engineering Without Benefit of Engineer Counsel No Credit Either to Government or Engineers

By VANNEVAR BUSH *
Dean of Engineering
Massachusetts Institute of Technology

THE professions of law and medicine exert strong and generally beneficial group influence through their national professional organizations. The profession of engineering does not. No great legal change occurs without scrutiny and pressure from the American Bar Association. No move for the regulation of medical practice proceeds without the prompt, effective participation of the American Medical Association. Great engineering works are constructed in this country, and the group opinion of the body of engineers thereon is not even expressed, with results that are sometimes ludicrous. We have no reason to be proud of the influence of engineers on the course of government as it affects engineering. By and large our efforts have been pitiful.

Engineers not organized

The government digs a hole in the sands of Florida to no proved good purpose, and I hear no voice raised to say that we, the engineers of this country, insist that we be told authoritatively what the economic and engineering complexion of that particular hole really is. Much less do I gather that the hole will not be dug except when it has the blessing of the organized engineers of the country. The trouble is they are not really organized for this effective purpose.

The nearest we come to having a mouthpiece for engineers generally on important matters is in the American Engineering Council, founded in 1920 "to further the public welfare wherever technical and engineering knowledge and experience are involved, and to consider and act upon matters of common concern to the engineering and allied professions." This is exactly what we have in mind. Yet the engineer, with all his supposed genius for organization, has not rendered this the effective instrument that is sorely needed. Every country doctor knows of the American Medical Association. He may quarrel with its dicta; but he knows that with a host of others he influences its pronouncements, and he is proud that it represents him.

I would be willing to wager that a survey would show that there is a large fraction of engineers in this country who do not even know of the existence of the A.E.C. Certainly the average engineer has no feeling that his influence is even indirectly brought to bear upon their considerations of important public questions. It has not the intense interest and support of the profession generally, and its expressed opinions are to this extent ineffective. A devoted group of engineers deals meticulously with the affairs of A.E.C., and undoubtedly the situation is not their fault. It is none the less regrettable. There are some evident contributing factors to the situation: the average engineer pays no dues to A.E.C., sees no direct publication of A.E.C., and takes no direct part in the selection of this body of men who convene to decide upon the problems of the day. Pronouncements have not been strikingly timely. The engineering profession has held important group opinions, and has not seen them forcibly enumerated and spread on the front pages of the newspapers.

Central organization needed

There is real attention being given to the professional advancement and the technical interests of the profession. We have an enormously complex system of organization of scientists and engineers in this country, and yet no effective single central organization representing all engineers and expressing their viewpoint on public ques-

*Abstract of address at recent A.I.E.E. Convention, Milwaukee.

tions. We have an elaborate mechanism for bringing advice to bear on scientific and engineering problems as they arise in government, and this mechanism is not utilized to the full.

What is to be done about it? Certainly no solution lies in forming one more society to join the throng. Integration is indicated, and since societies now exist for all the express purposes we have considered, a duplication of effort by a newcomer would simply complicate matters. Rather, the existing mechanism should be simplified and strengthened.

Forum a function

Would it be of aid if the great national organizations, such as the American Institute of Electrical Engineers, were to take official and definite positions on public questions involving engineering? Personally, I do not think this is their proper function, for reasons I will discuss. This is being done in some national organizations, and the effect has not so far been especially helpful. It is another thing entirely for the A.I.E.E. to provide a forum for the frank discussion of important questions by men of all shades of opinion. In this I believe it has a duty to perform. So far it has not been done, and the reason seems to be that those in control of the society have not had the courage to do something which might conceivably disrupt the society.

Perhaps a frank and fearless discussion on the floor of an A.I.E.E. convention of such a problem as that of the proper sphere of activity of government in the generation and distribution of electric power would split the society. I do not think it would. This is certainly a matter of present interest to electrical engineers. If those who are best able to approach it dispassionately and intelligently fear to open the question at all, how is public opinion to be influenced? There are in the membership of the Institute men who hold all sorts of opinions on this subject, many of them violently. There are many who will not express their honest opinions because of their affiliations with government or with public utilities. But there are many more who can and will bring light upon the subject.

Taking of stands should be left to a body having that as its primary function. That body should be made up of men of great distinction in the profession, chosen for the purpose by the membership of the profession directly. It should use every legitimate means to be well known to the membership, by questionnaires, publications, and by reasonable publicity in regard to its deliberations and findings. It should be absolutely without fear and without prejudice. Its pronouncements should be front page news in every corner of the land. It should enter into any public question involving engineering as a right and without invitation. It should not hesitate to swing public opinion by rousing the profession when such action is indicated. In order that it may speak with a single voice it should represent engineers only, of course with deference to the opinions of other professional groups. We do not have this situation today. The metamorphosis of existing organizations, under the guidance of public spirited engineers, may bring it to pass. As it proceeds it should have the aggressive support of every engineer who has the good of his country at heart, whether or not he agrees with its findings in every respect.

We will not be on sound ground in this country until government, on a basis of adequate and dignified fees, calls for the opinions of independent consulting engineers whenever it has an important engineering problem. This it does not do at the present time to any determining extent. If, when the subject has been deeply studied, and reports have been prsented, the government wishes review by distinguished boards, it will always find men ready to give their services as a matter of public duty. The main reliance must, however, be upon independent consulting engineers, and I wish to make a plea on their behalf.

There are many engineers—many able engineers—in government itself, and these are utilized by government when it has an engineering project to carry out. Army engineers have carried forward on a high plane many outstanding engineering works. The Reclamation Service conducts a research laboratory which is second to none. But the government engineer is not an independent engineer and the latter is sorely needed. Given a definite project the government engineer can carry it forward; but he cannot at the same time say that it is a foolish thing to carry out at all, even if his engineering studies convinced him that such is the case.

If it were our practice in this country for government to employ independent engineers frequently, the number of such engineers would be greater. When government calls on the engineer at all, it usually attempts to do so on a niggardly basis. It appears to attempt to starve out a group, on which it distinctly needs to lean.

But part of the fault lies with engineers themselves. While we deplore any reluctance on the part of government to let the full light of reason play on its plans for engineering works, we must at the same time admit that the approach of engineers has not often been based on a broad enough consideration of these very matters. To show that a government engineering work will not pay an adequate financial return on the original investment is not necessarily sufficient to condemn it, yet engineers are prone to limit their considerations to a strict cost and yield basis. The building of a battleship cannot be justified on this basis. The setting aside of a national forest should not be thus approached with limited logic.

Do not think that I advocate letting down the bars of strict reasoning to which all engineering works should be subjected. I have no sympathy with any waste of public money.

•

To build a great dam to supply electric power in a region already amply supplied with power, to irrigate land in a region of no inhabitants while farm land stands idle close by, to render navigable a stream that proceeds into a wilderness, is a fool piece of work in any language.

•

Yet I would have the engineer join with the economist, the sociologist, the student of government, that he may grasp problems in their entirety.

Throughout I have emphasized the value of independence. As long as this is maintained, and there is the effective guidance of affairs by an independent professional class, I have no fear for the future. A true democracy, given this support, can compete with dictatorship and prevail.

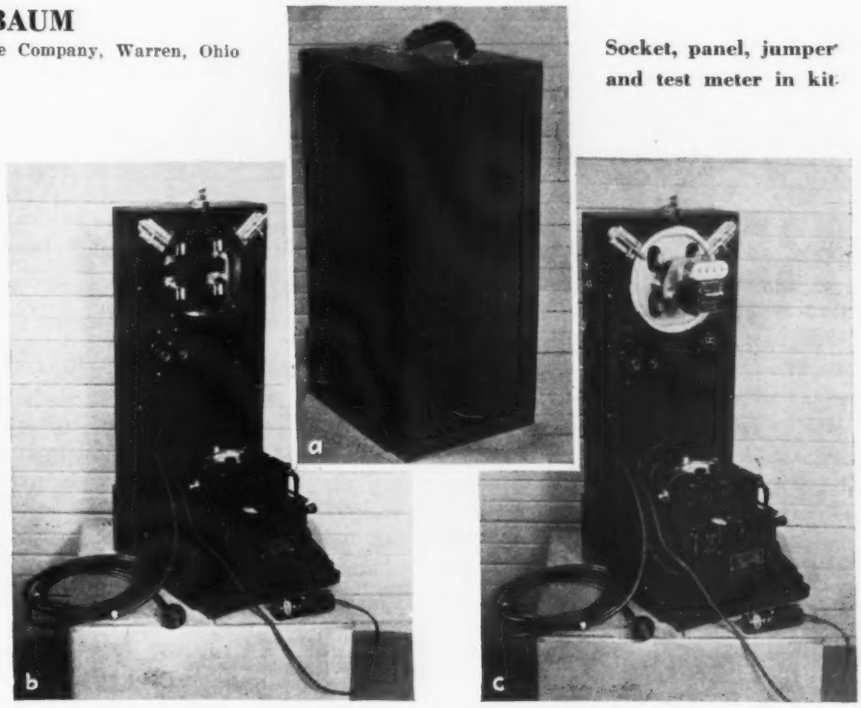
It was independent of thought, freedom of action, the opportunity of a

[*Continued on page 96*]

Socket Meters Tested on Customer's Premises

Portable Test Panel Affords Opportunity for Customer Contact at the Time of Meter Test

By J. S. BUCHSBAUM
Meter Service Foreman, Ohio Public Service Company, Warren, Ohio



Socket, panel, jumper and test meter in kit

The proper voltage for testing three-wire meters is obtained from a small 115/230-volt transformer, of 5 volt-ampere capacity, which is mounted on the panel. This panel is inclosed in a box having a hinged and removable cover and carried by means of a leather handle. A compartment is built into the upper part of the cover, which can accommodate tools and miscellaneous small repair parts, as well as the adapter plate with which "A" type meters may be tested. Dimensions of this entire outfit with cover installed are approximately 10 x 12 x 23 in. It is not too cumbersome to be easily carried and weighs 29½ lbs.

IN MEETING the requirements of routine tests of the "S" type meters two courses of procedure have been suggested: First, removal or change of all meters so that they may be tested at the central laboratory; second, a portable testing station such as a truck or trailer which can be located in the territories that are being worked.

With either of the foregoing methods there are drawbacks. We have always felt that contacts made with the customer at the time of periodic house meter testing were of great value, and with either of these suggested methods this opportunity is lost, since the meter is removed and a new one set without the customer ever knowing that this work has been done. The result is that the customer would never have proof of the fact that the meter undergoes periodic testing. Also, with the foregoing methods, a certain amount of transportation of the meter is involved and the actual accuracy of it, at the time it is reinstalled at its operating location, is somewhat doubtful.

Brings laboratory to premises

Meter men have always considered the routine premise testing of the meter at the exact spot where it is going to operate as the best and most accurate test. However, it is felt that the laboratory test, due to having more favorable surroundings, is conducive to better testing. What we propose to do is practically to bring the laboratory conditions to the premises and test the meter at almost its usual location and in the presence of, or at least on, the premises of the customer.

Use of the conventional test jack which has been designed for use in the "S" socket has limitations, due to the following reasons:

1. Many meters are installed at unhandy locations on the house, sometimes behind shrubbery.

2. Testing a meter out of doors in this manner is conducive to errors, due to weather conditions, wind, etc.

We have constructed a small test panel, on which are mounted a conventional "S" socket permanently wired to phantom load and rotating standard. Built into the test panel are tumbler switches, which enable the tester to change connections for testing either two- or three-wire meters. Fuses are installed to prevent the possibility of interrupting the customer's service should the tester fail to have his switches in the proper positions. (The fuses will be replaced by small breakers on test panels now being built.)

Asks privilege to test

Meter tester approaches customer's premises and informs the customer that he is there to perform the regular routine test on the meter and requests the customer's permission to bring the meter into the house to do this work.

[*Continued on page 98*]

2,000 Rural Miles in 12 Months

By P. T. MONTFORT
Director Texas Committee on the Relation of Electricity to Agriculture, College Station, Texas

With Low-Cost Lines, Texas Power & Light Reaches 10,000 Customers in 1936 — Utilizes Cost and Revenue Surveys, Adds Load Quickly, Marshals Co-operative Selling Aids

BUILDING on a foundation laid when the company was organized in 1912 in a rich agricultural section of Texas, the Texas Power & Light Company is proceeding with a well-planned rural electrification program which during the 24 years of the company's existence has made electric service available to nearly 40,000 farm and rural homes. Its transmission lines have extended central station service to more than 410 cities, towns and communities, of which more than 250 had no electric service prior to arrival of the company's transmission lines. Rates to many of these towns and communities have been reduced as much as 50 per cent over rates previously in effect.

Rural line construction of the Texas Power & Light Company cost in excess of $1,600,000 in 1936, according to John W. Carpenter, president and general manager of the company. The year's program showed slightly more than 2,000 miles of line completed and energized during the year (more than 290 lines), which made service available to approximately 10,000 farms and rural homes.

24 years of rural experience

This extensive rural development, one of the largest in the history of the company for any one year, was the continuation of a program originating with the organization of the company in 1912 and expanded in 1929 when the first ridge-pin, common neutral type of line was constructed. During 1935 the company spent $150,000 in building 145 miles of line to serve 840 rural and farm customers. By the end of 1935 the company had extended its service to a total of 29,379 customers living in small communities and on farms.

This substantial progress has been made in the face of such handicaps as (1) a population density of 23.2 per square mile, as compared to the national average of 42.5; (2) a relatively high (60.9) percentage of farm tenancy; (3) low farm income; (4) no large farm power applications such as irrigation.

There is nothing sensational in the fact that the company is among the leaders in the development of rural service, since the nature of the entire area served is primarily "rural." Of the 409 cities, towns and communities, embracing 53 rich agricultural counties, now served by the company, 58 have a population of less than 100; 179 have between 100 and 500 population each; only ten have a population greater than 10,000, and the largest served has a population of only slightly more than 52,000.

Farm home base for load building

A survey of agricultural conditions and practices in the territory served by the company indicates that the farm home offers the basic opportunity for load building. Because of natural conditions of climate and soil—as well as long years of habit—cotton is the chief cash crop produced. Where cotton production is the primary activity on the farm there is little need for power equipment other than in the home, including laundry, and for water systems.

The first step in the rural electrification program was a system-wide survey in which all farms and communities were located and classified on county road maps. From this a composite map of the entire area was made. From this map more detailed surveys, including estimates of cost and revenue, were prepared for each project where there was any indication of

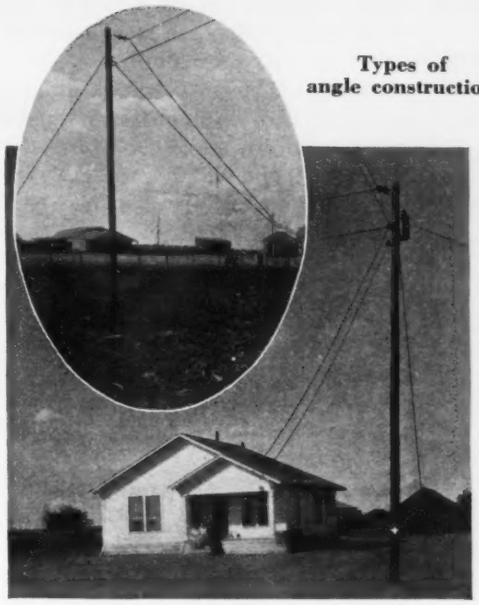
John W. Carpenter, president Texas Power & Light, recently described the close co-operation between his company and R.E.A. projects in contiguous territory, stating that the company "has volunteered services of its trained engineers for completion of technical details necessary to preliminary applications of R.E.A. allotments and is co-operating fully." But Texas Power & Light Company does more than assist R.E.A. It takes electricity to 40,000 farmers with its own lines. Here's how a large-scale job was carried along in 1936.

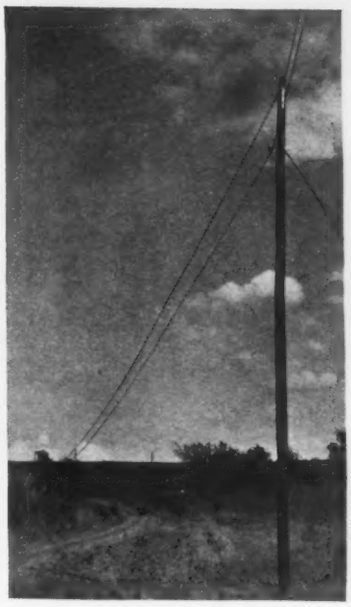
a reasonable ratio of investment to revenue. No particular area or section was singled out for development since it is the policy of the company to build lines into all sections of the entire area where the investment can be at all justified.

Supervisor combines utility and farm experience

Load development on rural lines is the responsibility of the rural service supervisor, assisted by a sufficient number of rural service men to cover the territory. The supervisor is a graduate of the state agricultural college and is a former county agent and teacher of vocational agriculture. He has had practical experience as a farm operator, in addition to several years of service with the company. He is a dairy specialist, regarded highly in the agricultural circles of the state. The district rural service men all have a background of agricultural experience, in addition to technical training. These men, with a first-hand knowledge of methods, equipment and machinery, are able to discuss intelligently the problems of each customer and work out with him the best possible solution.

Types of angle construction

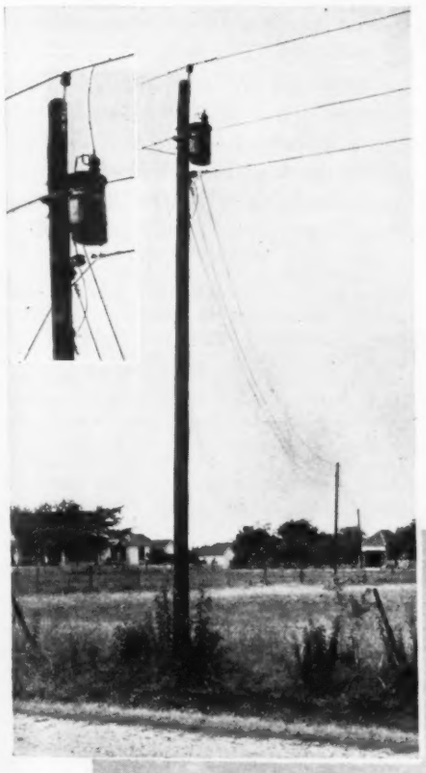


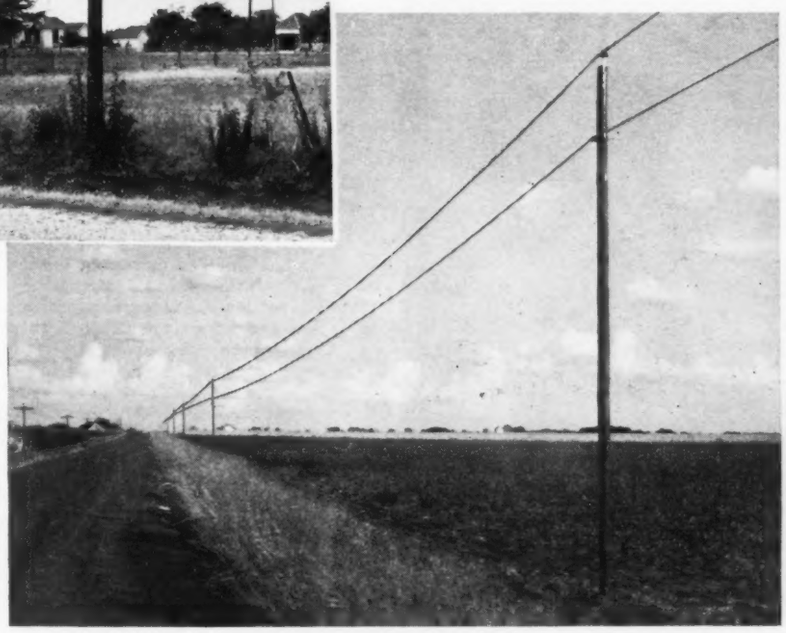


At left is a 15 to 60-deg. angle, center 60 to 90 deg. and right 2 to 15 deg.

Typical secondary—Many services are from individual transformers

This is a 3-kva. installation. Note secondary breaker mounted alongside the transformer.





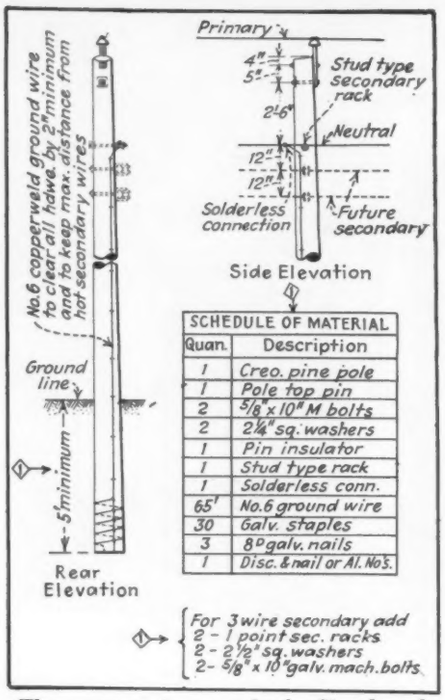
Across the Texas prairie—Long-span, ridge-pin construction is easy in flat, unwooded country like this

Two educational trucks work new lines as quickly as possible, one with water pumps for shallow and deep well demontrations and the other with a representative complement of household appliances, including range, refrigerator, washer, iron, small appliances and I.E.S. lamps. All prospects secured from these demonstrations are reported immediately to district offices for follow-up by salesmen. This information is made available to other dealers and manufacturers, some of whom are obtaining splendid business by prompt solicitation.

Close co-operation is maintained with dealers who stock equipment suitable for use on the farm or in the farm home. Particular emphasis is placed on rendering assistance to implement and machinery dealers.

Company engineers have co-operated with manufacturers in developing new equipment and machinery for farm use as well as adapting proved equipment to local conditions. Experiments are now being conducted with a "general purpose" or utility type farm refrigerator. An extensive study of forced-air ventilation for onion storage is also under way.

The company works very closely with the Texas Committee on the Relation of Electricity to Agriculture, which was organized in 1927, the organization meeting of the committee having been called by Mr. Carpenter. The committee is composed of a group of representatives from the agricultural colleges, farmers and power companies in the state. It acts as a


No.6 copperweld ground wire to clear all hdwe. by 2" minimum and to keep max. distance from hot secondary wires
Primary
4"
5"
Stud type secondary rack
2'6"
Neutral
12"
12"
Solderless connection
Future secondary
Side Elevation
Ground line
5' minimum
Rear Elevation
SCHEDULE OF MATERIAL
Quan. | Description
1 | Creo. pine pole
1 | Pole top pin
2 | 5/8" x 10" M bolts
2 | 2¼" sq. washers
1 | Pin insulator
1 | Stud type rack
1 | Solderless conn.
65' | No.6 ground wire
30 | Galv. staples
3 | 8d galv. nails
1 | Disc. & nail or Al. No3.
For 3 wire secondary add
2 - 1 point sec. racks
2 - 2½" sq. washers
2 - 5/8" x 10" galv. mach. bolts

The construction standard—Simple, effective, tested and inexpensive

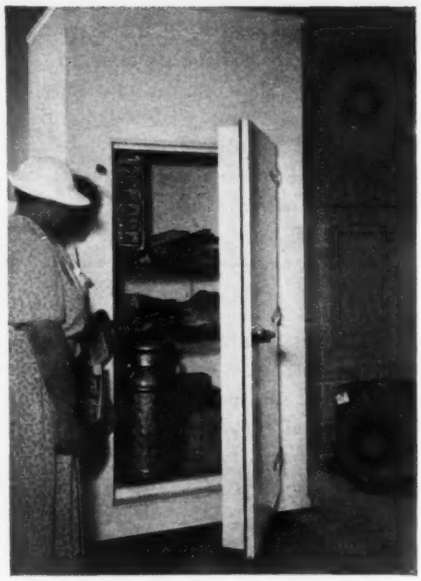
co-ordinating agency in research, investigation and dissemination of information. Through a series of surveys, investigations and research the committee has contributed very valuable practical information as to ways in which the farmer can satisfactorily use electric service in such volume as to justify the investment necessary to render the service.

Accurate records, by means of card files, are kept for each farm customer. These records show appliances being used in the home and on the farm, prospects for additional equipment, monthly billings and other information which will enable the rural service men to canvass the territory systematically.

How T. P. & L. farm lines are built

Adoption of the common-neutral, single-phase, ridge-pin type of construction, together with other attendant economies, was one of the most important factors which enabled the company to launch its large program last year. At least ten years ago company engineers began to consider this type of construction as a possible way to offset the bugaboo of excessive line costs and low customer density. The first experimental line, involving 15 miles of line including tap lines and operating at 2,400 volts, was built in 1929. At about the same time the company built its first three-phase, four-wire, 12.5-kv. line. The type of line being used by the company today is not experimental. It is the result of many years' experience and careful study.

The ridge-pin, common-neutral, 7.2-kv. type of line generally has been found most economical, even though step-up or step-down transformers may



Developing equipment for Texas farms
Experimental 30-cu.ft., all-purpose farm refrigerator built by T. P. & L. engineers and displayed at farmers' short course at Agricultural and Mechanical College of Texas.

be necessary at the point of origin. Conversion of 12.5-kv. lines to two-phase wires and a neutral is desirable where the load is comparatively light and where only a few three-phase transformer banks need be changed.

POLES—Thirty-foot minimum, 5- to 6-in. top poles are recommended except where proper grading or the clearing of obstructions necessitate higher poles. Thirty-foot poles are set to a minimum depth of 5 ft.

GUYING—Guying to meet National Electrical Safety Code requirements is carefully adhered to as a minimum. Angles of 60 deg. or less are guyed with split-angle guys. Those greater than 60 deg. require separate guying to take the strain in each direction. Patent anchors and three No. 9 Copperweld guy strand are used where the strain is not too great. Where necessary, 10,000-lb. Copperweld guy strand and anchor logs are used.

CONDUCTORS—Copper, aluminum and Copperweld have been used on long lines or lines which may be extended later. On short lines and radial taps No. 6 steel conductor is generally used. Copperweld has been used where sag conditions necessitate long spans.

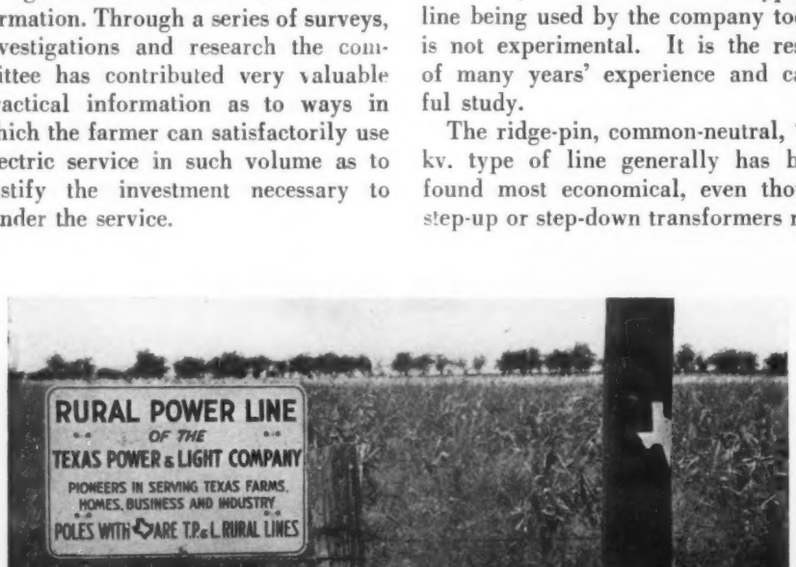
All conductors are sagged for medium loading under a maximum tension of 50 per cent of the ultimate strength. Sagging of all conductors is carefully checked to see that sag values are adhered to closely.

Conductor clearances are maintained in accordance with code requirements and state regulations.

SECONDARIES—Secondaries under ACSR primaries are usually No. 2 ACSR seven-strand conductor. Ordinarily 300-ft. spans are the maximum used in sections requiring secondaries under a primary. Under steel conductors secondaries are also No. 2 ACSR seven-strand conductor.

It is usually more economical to install a transformer for each customer than to run secondaries under steel primary lines since the customers are usually widely scattered

[*Continued on page 110*]


RURAL POWER LINE
OF THE
TEXAS POWER & LIGHT COMPANY
PIONEERS IN SERVING TEXAS FARMS, HOMES, BUSINESS AND INDUSTRY
POLES WITH ARE T.P.&L. RURAL LINES

No secret—Signs along lines show passersby that T. P. & L. is doing a rural service job and symbols mark company poles

National Power Sales Advertising Gaining Favor

Experience in Promoting Program Indicates That Electric Utility Industry Is Ready for Concerted Movement to Retain and Extend Commercial and Industrial Business

By R. D. HAYES
Chairman National Power Sales Publicity Committee

WITH a little bit of optimism it is possible to see, within a year, the electric utilities of this country advertising their product —electric service—on a national scale to industry and business. This hopeful conclusion arises from the experience in promoting the idea of national power sales advertising since the project was started last spring at a meeting sponsored by the Great Lakes Power Club.

At this meeting, attended by power salesmen and other commercial executives from all over the United States, the case for national advertising of central-station power service was presented. It was shown there how the technology of power supply had greatly changed in the past few years and how this change, representing very real progress in the art, had immensely increased the competition against central-station service. The competition, piloted by aggressive and keenly intelligent men, makes use of all legitimate selling instruments, among them continuous and extensive advertising, to forward its cause. Why should not the electric utilities use the same tools and as vigorously?

Cost not everything

This question has particular pertinence in view of the fact that the competition against central-station service has only one argument, dollars and cents cost, which, however, valid it may be in isolated instances, does not by any means hold true in any significant proportion of business and industry uses of electric service. Central-station service embraces much more than cost per kilowatt-hour; it includes many other benefits and advantages, some of them definitely evaluable in money terms and others difficult of exact monetary statement, but very real and tangible none the less. Yet here is competition, based entirely on a slender claim of money economy, able by aggressive salesmanship and by the use of modern selling tools to make hard-headed American business men and industrialists forget that much more than mere kilowatt-hours is included in central-station service. And why? Just because the electric utilities have not learned to use modern sales technique in making the values and advantages of their service known to their customers.

First action last spring

This was, in general, the case as it was presented at the meeting in Chicago last spring. By a motion in the meeting a committee of some twenty-five of those present was appointed. This group, taking the title of National Power Sales Publicity Committee, after further discussion of the matter, selected an executive committee consisting of R. D. Hayes, Middle West Service Company, chairman; P. W. Romig, Wisconsin Public Service Corporation, secretary; W. H. Sammis, Commonwealth & Southern Corporation; J. F. Gaskill, Philadelphia Electric Company, and Ford Bates, Nebraska Power Company.

The presentation at the Chicago meeting was made by Harry B. Hall of Klau-Van Pietersom-Dunlap Associates, a Milwaukee advertising agency that had been retained by the Great Lakes Power Club to tell the story. The presentation required, of course, a large amount of research, study and preparatory work on the part of the agency.

Since the meeting last spring the agency has been very active in telling the story to utility executives in many different parts of the country. The story has been told to operating company and to holding company officials from New York to California. With one single exception, the presentation has met with enthusiastic approval. So far there appears to be a much greater body of favorable opinion on the program than even the most optimistic of us had looked for when the committee was organized last April. We had feared that the promotion might require a year or more of educational work within the industry. But we are encouraged to believe now that it is entirely possible to get the program into actual performance by early fall and that is our objective.

"Conditional contracts" prepared

Very soon now the committee expects to send "conditional contracts" to all operating companies. These contracts will provide for tentative commitments, but will not be binding on any company unless and until 60 per cent of the industry, measured in gross revenue with domestic and rural sales and sales to other utilities excluded, agrees to participate. This means that

[*Continued on page 106*]

Revenue Rises 7.3 per Cent

April Sales for Industrial Power, 21.6 per Cent Above 1936, Set New Record; Domestic and Retail Use Also Well Above Last Year's

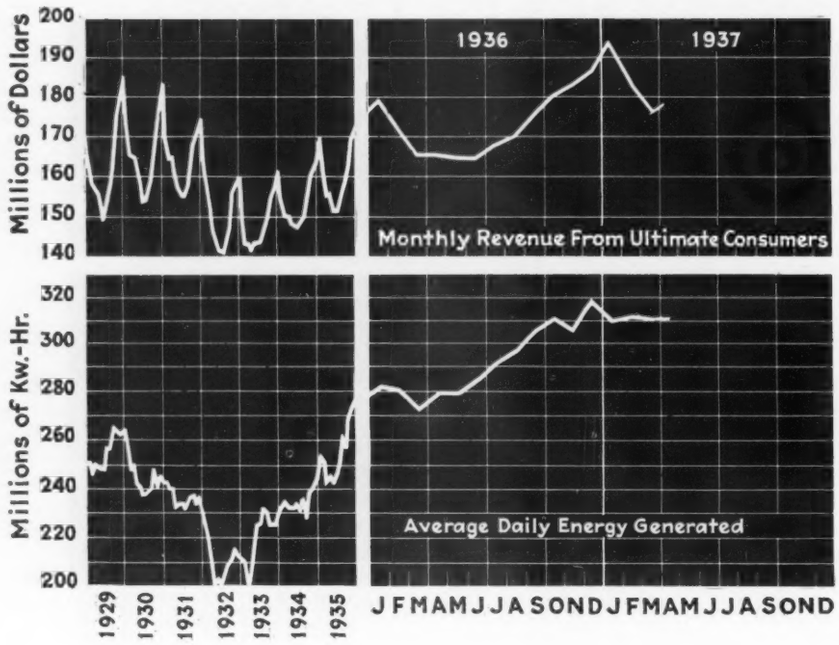


Table I—Monthly Revenue from Ultimate Consumers and Energy Output of the Electric Light and Power Industry

Compared with Corresponding Month of Previous Year

Month 1937	Revenue from Ultimate Consumers‡		Energy Generated, Millions of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.
April	177,861	+7.3	9,335	+13.1	3,859	+ 6.0	5,476	+18.6
March	177,579	+7.2	9,664	+16.6	3,624	+ 5.1	6,040	+24.7
February	183,586	+7.2	8,752	+ 9.6	3,261	+23.4	5,491	+ 2.7
January	194,554	+8.6	9,614	+11.5	3,605	+16.1	6,009	+ 8.9

* By courtesy of Federal Power Commission, with deductions for certain plants not considered electric light and power enterprises. ‡ Edison Electric Institute.

Table II—Allocation of Energy by Classes of Service, 1937

Compared with Corresponding Month of Previous Year (Edison Electric Institute)

Class of Service	April		March		February	
	Millions of Kw.-Hr.	Per Cent Inc.	Millions of Kw.-Hr.	Per Cent Inc.	Millions of Kw.-Hr	Per Cent Inc.
Total for distribution*	9,584	+15.0	9,908	+18.3	8,927	+11.2
Lost in transmission, etc	1,314	+ 3.7	1,691	+15.6	954	- 7.1
Sold to ultimate consumers	8,270	+17.0	8,217	+18.9	7,973	+13.9
Domestic	1,418	+16.0	1,425	+13.7	1,573	+17.4
Com'l, small light and power	1,466	+14.5	1,451	+15.5	1,534	+15.9
Com'l, large light and power	4,672	+21.6	4,553	+24.8	4,115	+17.1
Municipal street lighting	162	-16.2	181	-13.7	184	-15.8
Railways — street, interurban	367	- 2.1	414	+ 5.3	401	- 7.9
Railroads — electrified steam	111	+29.1	120	+14.4	95	- 0.1
Municipal and miscellaneous	74	+ 5.5	73	+ 5.9	71	- 1.9

* Generated, purchased from other sources, imported, less energy used in railway and other departments.

REVENUE gains in the electric light and power industry during April maintained the pace of the two preceding months with a rise of 7.3 per cent over a year ago to $177,860,900 received from ultimate consumers, according to the Edison Electric Institute. The corresponding figure for 1936 was $165,702,900. The new total is slightly larger than the revenue reported for March, whereas in most of the recent years the movement at this season has been moderately downward, due largely to the normal decrease in energy sold for domestic and retail commercial lighting. Effects of labor disturbances are not reflected in these returns; they occurred later.

Gain over 1,000,000,000 kw.-hr.

Energy production exceeded that of a year ago by 13.1 per cent, the total amounting to 9,335,489,000 kw.-hr. The average daily output was approximately the same as in March. Water power contributed 41.3 per cent. While the increase from this source was only 6 per cent compared with last year, the actual production, 3,859,251,000 kw.-hr., was the largest on record.

Energy sales topped those of any other month except January, 1937. The largest share, 56.5 per cent, went to wholesale commercial customers. Sales to this group, largely for industrial use, rose 21.6 per cent over a year ago and set a new record somewhat in excess of the amount in October, 1936, which was the previous maximum. Sales to domestic and retail commercial customers also give evidence of results from load-building programs.

The number of ultimate consumers was 26,385,221, compared with 25,517,576 at the end of April, 1936. For the twelve-month period ended April 30 average annual consumption per domestic customer increased 8.1 per cent, compared with the preceding one, to 748 kw.-hr., the average rate dropped 6.1 per cent to 4.60 cents, the average monthly bill increased 1.1 per cent to $2.86.

It's the Woman Who Pays

By VIVIEN KELLEMS
President Kellems Products, Inc., New York, N. Y.

Underwood & Underwood

Recently an Eastern utility company serving a residential territory elected a prominent club woman to its board of directors just to get the woman's point of view. What is the woman's viewpoint? Is it different from man's? Why should it be understood by a public utility?

And so, with our questions, we went to a woman long prominent in the electrical industry—a woman who for years has been speaking to women's organizations—one close enough to the utility industry through business contacts so that she would be sympathetic in her appreciation and understanding of the utility problem—Miss Vivien Kellems, president of an electrical manufacturing company, the output of which is sold very largely to utilities.

Here is an answer that, instead of emphasizing the feminine side of woman, gives her a distinct economic evaluation.

WHEN the central station first came into being the economic position of the average woman was not important. A married woman in those times had no claim to her property or her earnings. She could make no contracts. She had no voice in government, and endless other discriminations served to put her in a distinctly unimportant class, at least as far as the light and power industry was concerned.

Having practically no economic status, she presented no particular public relations problem. Gradually, however, her condition has changed. But so gradual has been the change that we have not realized that many formerly successful sales approaches need revamping in order to meet new conditions.

In general, it is believed that the only change in woman's status is that she has been accorded the vote. But as the suffrage area widened the number and kind of discriminations against her economic position diminished steadily.

Today laws have been passed giving married women the capacity to own, manage and enjoy separate property and to "own" their earnings. They have the right of divorce. They are eligible for public office and, in a growing number of states, the right of jury service. They now have parents' rights to children's earnings and to their guardianship.

For the first time in its long history the Association of the Bar of the City of New York in May decided to admit women attorneys to membership by an almost unanimous vote.

It would seem that women are now people, at least as seen through legal eyes. And from the standpoint of money look at the following information. Here is food for thought and justification for a recent public utility's action in electing a woman to its board of directors:

Women are beneficiaries of about 80 per cent of the hundred billions of life insurance policies in force.

Women pay taxes on more than 3 billions of individual income annually.

Women comprise the actual majority of stockholders in several of our largest corporations.

Women millionaires, as indicated by income tax returns, are nearly as plentiful as men.

Women are receiving the largest percentage of estates left by other women.

Women to the number of 8½ million are gainfully employed.

It is a sad commentary that status is generally measured by wealth, but, after all, money income measures command over goods and services, and women, in their own right, hold a more and more important share of the country's income. This large amount of purchasing power controlled by women warrants deep study by those utility men whose duty it is to see that the true story of the utility's function is understood by those who comprise the majority. Because women constitute in so liberal a sense

[*Continued on page 100*]

Editorials

TVA Needs the Revenue

WHAT is back of this feverish haste of TVA to sell huge blocks of power? First there was the Arkansas Power contract without resale regulation and now comes one with the Aluminum Company which leaves that concern in full control of the Little Tennessee River. Even Representative Rankin and other friends of TVA in the power bloc are unable to understand the situation and are demanding that the Arkansas Power contract be withdrawn unless the resale yardstick is restored.

To those who have been following TVA closely the answer seems obvious. The Authority is desperately in need of revenue. It has been intimated that after laboring for four years TVA is not bringing in as much each month for power sales as the Army engineers obtained for Wilson Dam power alone for years before TVA took it over.

Unless TVA can make some better kind of a revenue showing soon, it may have a much more difficult time securing additional money. And, furthermore, any difficulty in disposing of TVA power might well be reflected in opposition to the 7-TVA bills. Therefore, more haste in signing up TVA power.

However, the haste is disclosing the utter absence of any power policy on the part of TVA. Everything so far has been a matter of expediency. It may not be too much to hope that further congressional support of TVA will be predicated upon a rather definite power policy. One thing is certain, that no matter what happens to the Arkansas Power contract, the yardstick principle for resale rates has not been abandoned.

•

Management Looks at the Water Heater

SLOWLY but surely the electric water heater is assuming a new role in the eyes of management. The need for more net earnings has led to a more intensive search for new uses of electric energy, and it is this need which has contributed so much to the growth of the water-heating business.

Here is a device that can average 3,000 to 4,000 kw.-hr. per year, and is now developed to the point where, once installed, it requires a minimum of attention from either the owner or the utility. As appliance servicing problems assume a major importance in the next few years, the water heater will probably prove to be least burdensome. Meanwhile, the utility derives a substantial amount of revenue from the water heater and the energy is used under fair service characteristics.

A summary of today's water-heating possibilities, approached from the broad viewpoint of management and described by the country's number one exponent of electric water heating, K. M. Robinson, appears in this issue. To the managers of many properties who are trying to maintain net earnings in the face of rate cuts, increased taxes and higher operating expenses, this story of how future earnings can be advanced to appear on current income statements offers some stimulating suggestion.

•

Trolley Bus Winning the Public Rapidly

MANUFACTURERS are authority for the assertion that every city over 50,000 population could use from 10 to 1,000 trolley coaches, each consuming about 120,000 kw.-hr. a year. That this is no idle claim is borne out by the progress made in this field in the last year. More were sold than in all preceding years combined. Without exception, in every city where opportunity was afforded to compare the trolley bus with the gasoline bus and to vote for a choice the trolley won by landslide majorities. Gas bus manufacturers are all building or ready to build trolley coaches. Those facts are enough to confirm the claim of public preference. Elizabeth, N. J., is even asking to have the wires reinstalled so it can have trolley coach quietness, smoothness, speed and gliding acceleration.

Transit folks are convinced that, where the riding is or can be rebuilt to appropriate volume, the trolley coach will earn far more during its useful life than a gasoline bus. Briefly, in the transit industry, as in any other, electric power means earning power.

All maintenance costs are less for comparable service. Energy at 1 cent costs only $\frac{2}{3}$ as much per car-mile as gasoline at 12 cents. No coach could carry a gasoline engine big enough to give the acceleration obtainable from a wire running to a big power source. There are no gas fume headaches. Light, heat and ventilation are far superior. Schedules are faster. Life is longer. Capital stability is sounder. Patrons let the gas bus pass and wait for the electric coach.

Americans are enamored of the electric way. Riding electrically is one inescapable prospect of modern living. Power utilities have here an opportunity to encourage this healthy trend at every angle where their participation can discreetly be of assistance.

Company Memoirs Show Problem of Historical Value Determination

REGULATORY obsessions about ascertainment of historical values would moderate if the boards would contemplate the evolution of these properties from their insignificant beginnings. Even the public would take a different attitude if it were disabused of the idea that the present systems popped somehow full formed, like a modern Athena, from the brow of a Zeus. The actual evolution has been at the cost of high rates of obsolescence dictated by unrelenting technical progress. Much of this frequently repeated obsolescence occasioned generous allocations out of surplus earnings, but much also called for the acquisition and investment of wholly new funds.

Confirmation of this incessant turnover can be found in such reminiscences as are typified by the fine recital by Thomas H. Yawger in a series recently concluded in the *News* of the Rochester Gas & Electric Company. The installments of the series were colorful, dramatic and ingenuous in their round-up of salient facts in the growing up of the company. Pictures of early plants and practices reveal excellently how fast the art has progressed.

Even for internal circulation such memoirs are most helpful in portraying to present-day employees that the company had humble beginnings, had pioneers to give it courage and impetus, had always a civic service outlook, had rewards for those of devoted allegiance and has steadily grown with more wholesome motives than mere private gain.

•

The Rural Service Problem Catches Up With REA

THE recent experience of the REA project at Bartlett, Texas, which increased its previous minimum bill of $1.10 up to $2.37 per month, lends point to the observation in the Annual Statistical Number of ELECTRICAL WORLD that "the farm situation presents as much of a problem to the (government) administrator of taxpayers' funds as it does to the utility administrator of stockholders' funds."

Here is an REA project which borrowed $45,500 to construct 59 miles of line to serve 202 customers. Energy was purchased from a municipal plant at 2 to 2½ cents, computed on the sum of customers' meter readings. Rates to customers started at 15.7 cents and dropped to 2 cents at the 155-kw.-hr. step.

Yet the co-operative found that barely enough money was collected to pay REA and that it was unable to pay the municipal plant anything. To meet this situation 50 of the members met and voted to double the minimum bill, although the number of kilowatt-hours permitted under the higher bill will be increased from 7 to 25.

As REA projects in general are being built to serve 3.54 customers per mile—about the same as the Bartlett project of 3.42—the question now arises as to whether other projects will be obliged to increase their rates for service. Such an increase would be most unfortunate, particularly if the Bartlett experience of raising the minimum bills had to be followed. For this defeats the very goal for which Congress allotted $410,000,000—the rendition of electric service at low rates to the farmer.

•

Counter-Shock Resuscitation Given Undue Publicity

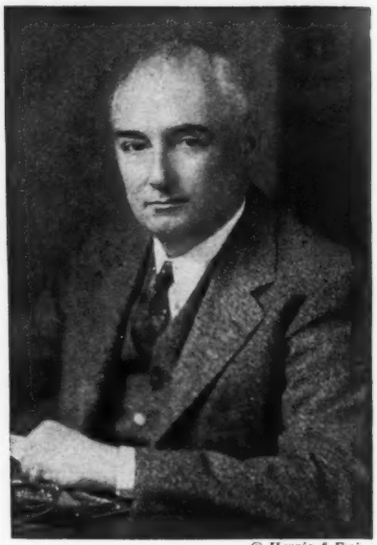
ACCIDENT prevention activities of the utility industry have accomplished a remarkable task in reducing the losses from electrical fatalities and lost employee time, to say nothing of the good will that came with less and less harrowing news of misfortune. Nevertheless, the daily press still gives a disproportionate amount of prominence to any human injury that can at all be attributed to electrical causes and that unearned publicity distresses those who have never ceased to make electricity steadily safer for utility employees and those who use the service.

But what disturbs the safety promoters even more is the prominence given in the lay press to the laboratory results from applying a second electrical shock to resuscitate an animal already in the fibrillation stage because of a first shock. In so far as these studies reveal something of the mechanism of organic incapacitation because of electrical shock and, still better, of the mechanism of recovery of normal automatic functioning they are surely to be encouraged. But it would ease the peace of mind of safety workers if the proponents of this laboratory measure of exploration would acknowledge that there is not one chance in a million that the technique could ever supplant or even supplement the prone-pressure resuscitation as performed by well-trained line crews. To be successful resuscitation has to start within a few minutes of the accident. To rig up for application of counter-shock in this emergency interval would in the first place create a new hazard for the rescuers. If it were unsuccessful in reviving the victim no one would ever know whether the first or the second shock had killed the victim. In short, it is utterly impracticable for counter-shock to become a part of utility technique in resuscitation. For doctors and police to undertake it is another matter.

Counter-shock is a tool for laboratory study of shock pathology and is in no sense a procedure to adopt at the base of pole out on the highway or anywhere else but in a laboratory.

Lilienthal Is King at TVA

By CARTER FIELD



© Harris & Ewing

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him

DAVID E. LILIENTHAL is king at TVA. Dr. Arthur E. Morgan is just a minority stockholder. Dr. Morgan is still chairman, but his only function is to vote. He is no longer chief engineer. He no longer has any administrative duties. True, all Lilienthal can do is to vote—and make speeches. All three members have been deprived of their executive duties. But when Lilienthal votes Harcourt A. Morgan votes with him, whereas Dr. Morgan votes alone.

It is true also that the executive duties have been transferred to Executive Officer J. B. Blandford, former safety director at Cincinnati. And that Dr. Morgan picked Blandford for TVA. But then Dr. Morgan also picked Lilienthal! And Dr. Morgan picked Harcourt Morgan!

Which reminds Washington of a famous remark once made by Speaker Cannon.

"I wonder why that fellow has turned against me," said Uncle Joe. "I never did him any favors."

But the whole TVA thing has been full of curious questions and answers. Why did President Roosevelt pick Dr. Morgan and let him set up an organization, pick the personnel and start things off? Certainly Dr. Morgan never dissembled to the President. His presence at the helm served to convince many that, so far as the electric industry is concerned, the President intended, eventually, to turn to the right. Which may or may not explain something.

The latest development should occasion no surprise to any one who has been studying the President's actions, or reading these articles in ELECTRICAL WORLD, and yet there have been a lot of optimists who thought the situation would work out differently. Notable among these optimists was Dr. Arthur E. Morgan.

Every time Dr. Morgan talked with the President he came away radiating conviction that the government was now going to treat the electric industry fairly. Not fairly as some of the bigwigs in the industry would define the term, but fairly as Dr. Morgan himself would consider it.

Judging by action after action, rather than by an occasional private and unreported interview which seemed to reflect the contrary view, President Roosevelt has been entirely in sympathy with Lilienthal all the way through. The only mystery is why he bothered to placate Dr. Morgan every now and then. As, for instance, the time last year when, as Lilienthal's term was about to expire, Morgan made it quite clear that he would resign if Lilienthal were reappointed.

Dr. Morgan went to the White House to lay down an ultimatum. But to his amazement he found the President *almost* agreed with his own viewpoint. The President could not hurry to put it into effect, it seemed, because a little educating would have to be done on Senator Norris and others first!

It now develops that Dr. Morgan is the one who was to be educated, and by a rather unusual process—assuming, of course, that Dr. Morgan can read something out of this particular lesson. It is just possible that it leaves him merely bewildered. According to Washington opinion Dr. Morgan knows more about engineering than about politics.

The fact stands out, as has been pointed out again and again in these dispatches, that President Roosevelt *is* in complete sympathy with the David Lilienthal-George Norris attitude toward the electric business. They think public ownership and public operation is the solution. They think that any claims the industry may have to a profit on a risk once taken have long since been paid through overcharging the consumers, and that, hence, duplication of facilities to provide government competition with privately owned systems is perfectly justifiable—should be resorted to except only in cases where a distinct saving—in fact a considerable saving—can be made by the government by purchasing the private plants and distribution systems.

The President talks very differently at different times, but he nearly always *acts* by moving in the same direction—toward public ownership. Senator Norris talks more frankly—acts the same way as the President. The most accurate exponent of the views of both, however, is Representative John Rankin of Mississippi. He is even frank about the price the government should pay when it takes over privately owned electric company property: "Second-hand prices for physical property—nothing for franchises or good will."

Recent contracts for the sale of TVA current to private companies may seem to belie the truth of this so far as the President's attitude—and that of Lilienthal—are concerned. But TVA will be able to make a better financial showing as a result—make the whole policy easier to defend—win more converts to the seven new TVA plan of Senator Norris. And actually does not impede progress toward the Roosevelt-Norris-Lilienthal goal one iota.

News OF THE WEEK

Pacific Gas & Electric Workers Shun Professional Labor Unions

Form own organization for collective bargaining with management — Dispute with CIO and AF of L over jurisdiction now pending before district labor board — San Joaquin Light & Power organize

Utility employees on the Pacific Coast, who look askance at the CIO or the AF of L, have formed their own organization for collective bargaining and as protection against professional labor organizations. Considered a most significant labor development, the movement has brought forth a dispute with the CIO over jurisdiction which is now pending before the district National Labor Relations Board. The AF of L craft unions were also involved.

The movement got under way when employees of the Pacific Gas & Electric Company formed the California Gas and Electric Employees Union, Inc., a non-profit corporation, to represent them in collective bargaining with the management.

Movement is notable

Students of the labor movement believe that this new organization is notable because: (1) It is incorporated; (2) it offers a method under the Wagner Act whereby employees who have no experience in labor unions and who look askance at the CIO or the AF of L can protect themselves from "professional labor organizers"; (3) its plan of organization, by-laws and objectives were set up after thorough study and were designed specifically to meet the needs of utility company employees; (4) it was organized spontaneously by employees without the participation or knowledge of the management.

The union was incorporated May 1 in the Sacramento division of the company, to serve that section only. The union now claims a membership of 6,000 out of the 11,000 employees of Pacific Gas & Electric. Membership takes in all classes of employees below the rank of supervisory officials. Back of the organization movement was the realization that whether they liked it or not, chances were they would be organized by some one.

Having had no experience with labor unions and feeling that membership in any of the existing national unions might implicate them in situations of which they had no conception, the employees decided to organize themselves for their own protection before any outside "third party" appeared to handle their relationships with management.

The plan of organization was carefully worked out to conform to the labor act and to facilitate relations with management under the terms of the act. The fact that the employees' union is incorporated has indicated a sense of responsibility. The union is to promote amicable relations between employees and management with full power to bargain on hours, wages and working conditions.

Locals to act

Broad principles were laid down, but their application to conditions in the twelve divisions of the company was left to the locals. There is a grievance committee for each group of about thirty employees. There are fourteen locals, one in each of the twelve divisions, one covering the mobile construction forces and another for the Kettleman Hills natural gas production employees. Headquarters are in Sacramento. Assessments are limited to $5 a year and the initial dues are 25 cents a month.

Since the organization employees of the San Joaquin Light & Power Corporation have organized the Western Utility Workers Union with a similar set-up and with similar by-laws and objectives.

In the June dispute over jurisdiction the CIO insisted that a system-wide poll be limited only to the 5,000 production and maintenance men. The new employees' union with its large membership does not fear the results of any poll.

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Utility Has Invested $30,000 an Employee

Investors of Consolidated Edison Company of New York System have "put up about $30,000 to set up the average employee of the system in a job and to give him the tools to work with," according to Ralph H. Tapscott, president in a recent issue of *Around the System*, the system's monthly magazine.

Mr. Tapscott pointed out that the fixed assets of the system, which has 42,000 employees, amounts to $1,200,000,000. This is equal to more than $28,500 for each employee, he said. Inventories on hand, and which must be maintained, amount to about $350 for each employee while other assets amount to over $800 per employee.

"This investment behind our jobs," Mr. Tapscott said, "has been supplied by the purchasers of the company's securities—those who have loaned money on bonds and those who have bought an interest in the business by

purchasing stocks." This group of investors numbers perhaps as many as 300,000 (there are 113,000 stockholders and no record of bondholders), he said.

It was pointed out by Mr. Tapscott that these investors included churches, banks, trust and insurance companies, estates, colleges, hospitals and charitable organizations, religious, civic and fraternal groups as well as thousands of individuals.

"These people and organizations have only one reason for buying securities of our companies," he said. "They want to realize an income from the investment, just as we want to get pay for our work. Their money and our work together make this business possible."

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Arkwright Says TVA Bars Power Expansion

Outlining the effects of the TVA on the utility industry, Preston S. Arkwright, president of the Georgia Power Company, told the Public Service Commission this week that "the menace of the TVA" jeopardizes the ability of his company to finance a program of expansion in Georgia.

"I have people coming to me every day asking me whether the company is safe to put their money in," Mr. Arkwright said.

"The bonds of the Georgia Power Company have been degraded because of the fear of what the TVA and its immensity would do with our property."

It was pointed out by Mr. Arkwright that "there is no reason why the TVA and the power companies working co-operatively could not achieve the aims of the TVA, but there seems to be a determination for the government to take over the power business."

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Two Months' Drive Nets 3,000 Range and Water Heater Sales

In the two months of a recent co-operative campaign sponsored by the Alabama Power Company and the Alabama Electrical Dealers' Association 3,065 electric ranges and water heaters were sold, or 365 more than the quota of 2,700 set at the beginning of the drive. Sales were about equally divided between the utility and the independent dealers.

Indiana Public Service Promotes Appliances to Low-use Customers

Employs postcard activities to sell low-priced articles in building load — Merchandise sales volume shows 46 per cent gain — Company concentrates efforts on adding customers along existing lines

A load-building program to increase wider use of electricity through the sale of electrical appliances among near-minimum-use customers is being employed by the Public Service Company of Indiana with satisfactory results, in the opinion of John N. Shannahan, president. Each month a postcard activity is carried on covering some appliance which can be offered to this class of customer.

Discussing the appliance sales activities of the utility, C. V. Sorenson, general sales manager, stated that so far this year the company has pushed a low-price iron, a factory-rebuilt cleaner, a Silex coffee maker, a low-priced toaster and a Mor-Light adaptor.

Sales of iron lead

Mr. Sorenson said that sales in items run from 1 to 2 per cent of the number of cards sent out, excepting in the case of irons, which run better than 5 per cent. The company sent out 1,500 cards for a dealer promoting the sale of radios and the dealer directly traced 47 sales to this activity. "This offer has now been extended to other radio dealers in our territory and we expect to get some very satisfactory results," Mr. Sorenson said.

For the first five months this year Public Service Company of Indiana authorized $178,000 for rural lines and added approximately 750 rural customers. Rural customers show an average increase of 7.5 kw.-hr. per customer a month over the previous year.

It was pointed out by Mr. Sorenson that the company operates in fifty counties in central and southern Indiana and never felt that complete coverage of these counties with rural lines was economically justified. The Indiana Farm Bureau is very active in promoting co-operative rural lines and the co-operatives have stirred up a great deal of interest throughout the territory served by the utility.

"Our general scheme of operation is that our rural service men concentrate their efforts toward adding customers along existing lines and building load among existing customers," Mr. Sorenson said. "We have worked very closely with the Agricultural Experiment Station at Purdue University and are quite active in promoting new uses for electricity in agriculture among our customers."

So far this year the company's construction program has been in sub-stations and transmission lines necessary to serve increased power business, of which 8,000 kw. was added in the first five months. The company has also been busy rebuilding and reinforcing urban distribution systems to take care of the growth in commercial and domestic load. It was said that this item is becoming quite important, especially where electric ranges and water heaters are being sold in quantity.

The company has added so far this year 7,800 electric customers. Merchandise sales volume has reached $653,000, an increase of 46 per cent over the same period last year. For the first four months revenue per average residential bill was up 13 cents and 4 kw.-hr., or an average realization of better than 3 cents per kw.-hr. on increased sales.

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Washington Water Power Plans Transmission Line

The Washington Water Power Company has completed surveys for a 50-mile, 110-kv. transmission line to serve a new copper development west of Lake Chelan. Construction work will be started in the near future.

In addition to the above work, the distribution systems in Garfield and Colfax, Wash., are being rebuilt; a new 13-kv. line is being constructed from Wilbur to Almira, where a 60/13-kv. sub-station is being constructed and is being tied in with a new 60-kv. line from Hartline. Material also is being assembled for a new sub-station at Coeur d'Alene, Idaho.

Plan to Purchase Nebraska Power Units Termed 'Promoter's Scheme'

Davidson says Federal projects are uneconomic and will find difficulty in obtaining power market — Utilities not receptive to proposal calling for purchase of private concerns in $100,000,000 venture

Efforts of certain municipal utility ownership officials to turn Nebraska into a "model power state" through the purchase of all existing private electric concerns and bring about a state-wide interconnection with public power projects appear unlikely to materialize any time in the near future.

A survey of the power situation in Nebraska, home state of Senator George W. Norris, father of the TVA, indicates that efforts are being made to "bail out" the public projects by consolidating them with the present profitable operations of the private utilities.

Plan is proposed

The plan calls for the purchase of facilities of Western Public Service, Nebraska Power, Iowa-Nebraska Light & Power, and Northwestern Public Service by the Loup, the Central Nebraska (Tri-County) and the Platte Valley (Sutherland) public power districts. It is estimated by representatives of the Loup River Power District, who have conferred with Guy C. Myers, Wall Street banker, on methods to arrive at a fair value of the utility properties proposed to be purchased, that the plan will involve a transaction of about $100,000,000.

J. E. Davidson, vice-president of Nebraska Power, stated that the proposal is merely a "promoter's scheme to make a lot of money." He said that the Federal hydro-electric projects in Nebraska are uneconomic and will be unable to find markets for the power generated and sell it as cheaply as the private utilities. Mr. Davidson said that a combine, as proposed, is out of the question. Only one company has been approached so far, he declared, and this company is not receptive to the idea.

PWA makes allotments

The PWA has made allotments for the power districts. A loan of $5,500,000 and a grant of $4,500,000 has been made to the Central Nebraska Public Power and Irrigation District for the construction of the Keystone dam, the second largest earth dam in the world.

The Platte Valley Public Power and Irrigation District in Sutherland has received loan of $7,585,000 and a grant of $2,580,000, and the Loup River Public Power District has received a grant of $2,175,000 and a loan of $6,525,000 from the PWA for its power project.

Senator Edward R. Burke, of Nebraska, has expressed disapproval of the proposal. He said he was in favor of municipal ownership, but not in favor of extending public ownership beyond that point.

Senator Norris declared that "if the properties could be purchased right it would settle the whole power question in Nebraska."

The private utilities in the state are now adequately equipped to supply an abundance of cheap electric power, and serve the load centers. It was pointed out that the utilities can generate power cheaper than they can purchase it from the Federal projects. On this basis it is seen that the Federal projects are not as economical as had been anticipated and their ability to be self-sustaining is questioned.

It is anticipated that if the Federal projects could be combined with the existing private utilities power could be distributed to central markets and a profit shown on the entire venture. Just what effect such a move would have on electrical rates to customers has not been made known.

•

Power District Lets Equipment Contracts

The Central Nebraska Public Power & Irrigation District, Hastings, Neb., has awarded contracts for electrical equipment for section of its hydro-electric power project, now under way, including oil switches and parts to Westinghouse Electric & Manufacturing Company at $110,699; transformers and accessories to General Electric Company at $75,788, and for switches, insulators and other equipment to Delta Star Electric Company, Locke Insulator Company, Ohio Brass Company and Gould Storage Battery Company.

H. S. Hunt, Jackson, Mich., is consulting engineer for the entire project, for which financing in amount of $21,700,000 is being carried out through federal aid.

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To Install Diesel Plant

Plaquemine, La., is to install a Diesel-generating unit to supply the community with power.

QUARTER-CENTURY TRIO—Celebrating the silver anniversary of their connection with the New England Power Association, Samuel C. Moore, vice-president; Clifford R. Oliver and William R. Bell, assistant vice-presidents, were awarded service pins recently at an Exchange Club luncheon in Boston. Reading, fifth from left to right—Mr. Bell, Arthur E. Pope, vice-president; Carl S. Herrmann, president; Mr. Moore and Mr. Oliver

Norris 7-TVA Plan Assailed by Magill

Billions of dollars in the value of investments in electric utility securities will be destroyed and billions of dollars of additional taxes will be loaded upon the taxpayers of the country if the gigantic government power program is carried out as provided in the Norris bill, according to Hugh S. Magill, president of the American Federation of Investors, Inc.

"In the guise of 'prudent husbandry' of our national resources the proposed legislation would clothe the national government with immense political, economic and social power," Mr. Magill said. "It would put the government into the electric power business in direct competition with practically every investor-owned utility operating company in the country through the construction of scores of government-owned and politically managed hydro-electric plants, under the direct control of seven regional 'Authorities.' It would literally TVAize the nation!"

It was pointed out by Mr. Magill that the "political consequences of such concentration of power in the hands of the President could be so far-reaching that it would strike at the very foundation of our American system of government."

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F.P.C. to Hold Aug. 2 Hearing on Merger of Nevada Utilities

The Federal Power Commission will hold a hearing August 2 on an application for approval of the issuance of 35,000 shares of preferred stock and 226,600 shares of common stock by Sierra Pacific Power Company, Reno, Nev.

It is proposed to merge Sierra Pacific Electric, holding company, into the Sierra Pacific Power Company. The 226,600 shares, of $15 par value, of the consolidated company are to be issued to holders of the 103,000 shares of common stock of the electric company. The preferred is to be exchanged on share-for-share basis.

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REA Loans for Virginia

The Rural Electrification Administration has announced the following loan contracts in Virginia: Virginia East Coast Utilities, Inc., Richmond, up to $125,000 to build 130.2 miles of line in Lancaster, Northumberland, Richmond, Middlesex, Isle of Wight, Sussex, Matthews, Gloucester, Surry, Patrick and Westmoreland counties; Northern Neck Electric Co-operative, Warsaw, up to $184,000 to build generating plant and 140 miles of lines in Lancaster, Northumberland, Richmond and Westmoreland counties.

•

Young Resigns Post to Conduct Survey

Frederick A. Young, chief of the Rhode Island Division of Public Utilities since March, 1935, has resigned to conduct a $225,000 valuation survey of electric power companies throughout the state with the object of determining the equity of rates prevailing in that jurisdiction.

Mr. Young was formerly electrical engineer with Jenks & Ballou, consulting engineers, Providence. It is expected that one of his chief consultants in the rate base inquiry will be William Keefe, chief engineer of the Massachusetts Department of Public Utilities. Mr. Young has just been accepted as a registered practitioner before the Interstate Commerce Commission.

Michael A. Ciantis, third assistant to the Attorney-General, has been appointed chief of the Rhode Island Division of Public Utilities, succeeding Mr. Young.

•

Seaford Light & Power Cited in Restraining Order

Application has been made by the Pennsylvania Company for Insurances on Lives and Granting Annuities for a restraining order to keep the Seaford Power & Light Company from exercising its franchise for the construction and operation of a power plant in Seaford. Refusing to renew the franchise of the Eastern Shore Public Service Company, the Seaford Town Council granted the Seaford company the privilege of distributing electric power, with the provision that the town could buy the company's property after five years.

The Pennsylvania Company set forth that it had acquired the property of the Eastern Shore Company and asked the Federal Court to take jurisdiction in the case.

Colorado Power Bill Approved by Senate

A bill authorizing the construction of the $44,000,000 Grand Lake-Big Thompson trans-mountain diversion project in Colorado, a combined irrigation and power development, was passed in the Senate and went to the House last week.

The total cost of the system chargeable to irrigation would be $24,666,079. For the initial power plant of 30,000 kw., including the necessary transmission lines and other facilities, the cost is estimated at $7,036,693. This would be increased to $19,083,243 with full development, totaling 142,500 kw. All plants would be of the high-head type, varying from 225 to 1,125 ft. of effective head.

The two pumping plants, both included in the initial development, would have a combined demand of 18,000 kw. Surplus power developed would be available for public distribution.

•

Indiana Power Project Proposal Filed With F.P.C.

The Federal Power Commission has received an application from the Acme Engineering Service, Inc., Ft. Wayne, Ind., which contemplates construction of three dams and two power plants, with a tentative installed capacity of 2,000 hp., on the Salamonie River in Wabash and Huntington counties, Indiana.

Proposal includes a dam and power house which would create a 60-foot head of water, a second dam creating a secondary storage of 10 additional feet and a third dam and power house creating a 25-foot head. According to the commission, the applicant proposes to sell the power to be developed in the open market or at wholesale to existing utility companies.

•

Files $10,000,000 Tax Appeal

Public Service Corporation of New Jersey has filed an appeal from a $10,000,000 municipal property tax assessment with the Essex Tax Board. In its appeal the company declared that $328,684,810 of the $329,742,901 valuation placed on its personal property was exempt from municipal taxation. On an appeal last year the corporation was assessed $5,500,000.

REA Year Allotments Total Most of Fund

Allotments for current fiscal year of the Rural Electrification Administration total $46,499,482 out of a total of $50,000,000 made available for loans this year under the terms of the Rural Electrification Act.

Under the emergency authorization, prior to the passage of the act, REA-approved projects totaled $14,612,628, making a total of $61,112,110 lent or earmarked. Loan contracts, binding the government to lend the money and the borrowers to install the electrification facilities, have been executed for $52,560,207 and bids for construction have been invited on projects totaling $41,427,620.

The act requires that half the loan funds be reserved for the state in proportion to the number of electrified farms. Several states have not utilized their full quotas, therefore the balance of the fund cannot be used.

•

Kings County Lighting to Continue 1933 Rates

The Kings County Lighting Company has been directed by the New York Public Service Commission to extend for one year the temporary rates now charged to its customers. These rates are estimated to have saved customers about $800,000 in the four years they have been in effect.

Milo R. Maltbie, chairman of the commission, said he was satisfied the company could not reasonably be expected to reduce its rates further, in view of increased taxes and other expenses due largely to municipal ordinances and federal legislation.

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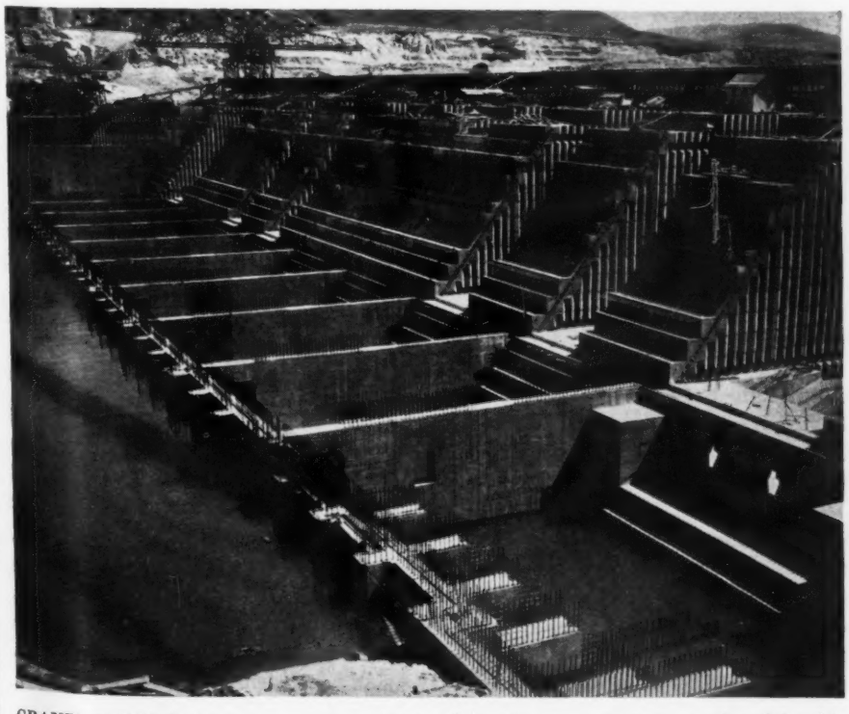
Arkansas-Missouri Deal Authorized

Applications by the Middlewest Corporation and its subsidiary, the Kentucky Utilities Company, for acquisition of certain securities to be issued by the Arkansas-Missouri Power Corporation in the course of the reorganization of the Arkansas-Missouri Power Company under Section 77b of the Federal Bankruptcy Act have been approved by the SEC.

An application by Arkansas-Missouri Power Corporation for approval of the acquisition by it from Arkansas-Missouri Power Company of all the other assets of Arkansas-Missouri Power Company, including all the common stock of East Missouri Power Company, also was approved.



GRAND COULEE—Downstream face of the federal power project on the Columbia River, with the power house foundation at the toe. This is the west section; east abutment in background at left

Tapscott Named Head of New York Utility

Ralph H. Tapscott, president of Consolidated Edison Company of New York, Inc., was elected president of New York & Queens Electric Light & Power Company this week to succeed Frank W. Smith, who retired on June 30, under the system's age limit of seventy.

Mr. Tapscott has been president of Consolidated Edison since March 17, when Mr. Smith, at his own request, was not re-elected to that office in view of his impending retirement.

Other officers of the Queens company elected at the organization meeting included Floyd L. Carlisle, chairman; Oscar H. Fogg, vice-chairman; Lawrence A. Coleman, executive vice-president; Harold C. Dean, vice-president; Douglas Brown, secretary, and Frank C. Gordon, treasurer.

Born in Brooklyn, N. Y., August 31, 1885, Mr. Tapscott graduated from Union College in 1909 in electrical engineering and then joined the testing department of General Electric Company. The next year he was transferred to the lighting engineering department. He became assistant chief electrical engineer of the New York Edison Company in October, 1917. In 1925 he became electrical engineer and in 1932 vice-president of his company and also of the United Electric Light & Power Company. He was elected vice-president of Consolidated Edison in 1936.

Mr. Tapscott is a fellow of the American Institute of Electrical Engineers and has served as a vice-president and director as well as chairman and member of several committees.

•

Correction in Award

The award for the condenser equipment for the city of Jacksonville, Fla., municipal electric plant was made to Westinghouse Electric & Manufacturing Company instead of to the Allis-Chalmers Manufacturing Company, as was reported in the July 3 issue of ELECTRICAL WORLD.

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Plan Diesel Power Plant

The City of Lake Providence, La., is planning the installation of a complete Diesel-generating set to supply the city with power.

TVA Directors Fail on Valuation Costs

Inability of the directors of the Tennessee Valley Authority to reach a conclusion as to the proportionate cost to be charged to flood control, navigation, fertilizer, national defense and power development in respect to facilities at Wilson Dam and the steam plants at nitrate plants Nos. 1 and 2 was reported to Congress last week. The report was in the form of a letter signed by Harcourt A. Morgan, vice-chairman of the TVA directors, which was approved by President Roosevelt on May 6.

The cost allocation was directed in section 14 of the Tennessee Valley Act as amended, and was due January 1, 1937. At that time Congress was notified that additional time would be necessary, and this conclusion is repeated in the present letter, which stated that the studies are being carried further by the TVA board.

It is also pointed out that the principles established in this instance will undoubtedly apply to other cases in the future in allocating the costs of multi-purpose projects, and for this reason the board must exercise unusual caution in reaching its conclusions.

•

Senator Norris Will Leave Washington Due to Illness

Senator George W. Norris of Nebraska, who has been a patient at the Naval Hospital for several weeks, will be unable to attend the balance of the present session of Congress and has left Washington.

The Nebraska Senator, who was 75 years old on July 11, is reported to be in excellent general condition, but his advanced age and the effects of his recent gastronomic complaint make it advisable for him to rest from legislative duties.

•

Court Halts Plan to Retire Stock of New York Utility

A permanent injunction restraining the New York & Queens Electric Light & Power Company and the Consolidated Edison Company of New York, Inc., from amending the charter of the former to permit the preferred stock of the company to be subject to call and retirement was granted last week in Brooklyn by Supreme Court Justice Albert Conway.

A year ago Consolidated Edison sent notices that the stock would be called at 108⅝ a share. Minority stockholders protested and action was brought to prevent the carrying out of the plan.

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Recent Legislation

MICHIGAN—When the deadline for transmitting bills between the House and Senate passed the Legislature killed for this session the controversial rural electrification measure which would have prevented any utility company from extending its services without permission from the Public Utilities Commission. The bill was twice defeated in the House, after bitter battles on the floor.

PENNSYLVANIA—A last-minute attempt of State Democratic Chairman David L. Lawrence to force the Holland Bill, permitting local taxation of the real estate of public utilities, out of the county government committee failed. Senator B. B. McGinnis' motion to discharge the committee was defeated by a vote of 28 to 18 and the bill died in committee. The bill had passed the House after a long struggle. An amendment to a bill authorizing third-class cities to acquire and maintain electric light and gas companies, leaving the decision as to the adequacy of present service up to the Public Utility Commission, was passed by the Senate 46 to 0 and by the House by a vote of 153 to 53. However, the House has refused to concur in Senate amendments. A measure which would permit first-class cities to use reservoirs, dams and water works erected for water supply purposes for the generation of electric power, to erect the necessary power plants, distribution substations and transmission lines, to enable it to use, purchase, sell and dispose of electric energy within and outside its corporate limits with the consent of the owner and the Water and Power Resources Board was passed by the Senate by a vote of 34 to 13.

WISCONSIN—A bill which places co-operatives furnishing light, power, heat, water and telephone in the same category as other utilities for the purpose of issuing bonds and borrowing money has been approved by the Wisconsin Senate. The measure had been passed by the Assembly.

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Carolina Power Project Hearing Date Set by F.P.C.

The Federal Power Commission will hold a hearing on July 23, in Washington, on a proposal by the Carolina Aluminum Company to construct a dam, reservoir and power house, with an installed capacity of 54,000 hp., to be located on the Yadkin River near Tuckerton, N. C.

The project would include a dam approximately 1,320 feet long and 93 feet high, a reservoir with a usable storage of 23,000 acre-feet and a power house, operating under a normal head of 55 feet. Purpose of the development is stated as the generation of electric power for public service and industrial use by the company.

Westinghouse and G.E. Plan Exhibits at Fair

Westinghouse Electric & Manufacturing Company and General Electric Company have contracted for exhibit space at the New York World's Fair of 1939, Westinghouse for space in a fair-built building, General Electric for space on which to erect its own building.

Westinghouse signed the first formal contract for exhibit space in a building to be built by the fair when its vice-president, D. S. Youngholm, signed a contract calling for 10,922 sq.ft. of floor space in the Electrical Production building at the scale price of $152,908. According to the company, its exhibit will feature research and its effect on future living.

Charles W. Appleton, General Electric vice-president, signed a contract for 68,339 sq.ft. of space on the fair site on which the company will erect its own building. Space charge for the land was $34,689.30 less discounts. Particular emphasis will be placed on electricity in the "world of tomorrow," Mr. Appleton indicated, adding that the exhibit would "considerably amplify" the "House of Magic" presentation used at the Chicago Century of Progress.

•

Long Named Rate Consultant to Public Service Commission

Earl K. Long, Lieutenant-Governor of Louisiana and brother of the late Senator Huey P. Long, has been appointed consultant to the Louisiana Public Service Commission in the electric, gas and telephone rate investigations now being conducted by the commission. Proceedings instituted by the commission against 28 electric and gas companies and the Southern Bell Telephone Company are now pending and no definite date has been set for the hearings.

•

Westinghouse Gets Contract

Columbia, Mo., has awarded a contract to the Westinghouse Electric & Manufacturing Company for furnishing one 5,000-kw. turbine generator unit for the local municipal power plant at $108,920. A contract for a 7,000-sq.ft. surface condenser at $34,052 was awarded the Elliott Company, Kansas City, Mo.

Indiana Utility Pays Mayor's Jail Board Bill

Northern Indiana Power Company has issued what is believed to be the only check of its kind ever issued by an electric utility, according to W. M. Large, district manager. The company paid the county treasurer of Huntington, Ind., $217.80 covering the bill submitted by the Board of County Commissioners for boarding Mayor C. W. H. Bangs while he was in jail for contempt of a Circuit Court injunction granted the utility against the city establishing a municipal power system.

The board bill was computed at the rate of 60 cents a day. While in jail Mayor Bangs did a lot of research and, it is believed, he uncovered an Indiana law of the 1850's which provides that when imprisonment is used in a civil matter the plaintiff in the suit is "liable for costs" for the board of the prisoner.

The case was closed when the city abandoned its plans of a utility system.

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Queensboro Rate Reductions to Save Customers $220,000

Queensboro Gas & Electric Company has been ordered by the New York Public Service Commission to reduce its electric rates, effective August 1. It is estimated that the reduction will save its customers about $220,000 a year, $146,000 by residential customers and the remainder by the commercial customers.

The new rate calls for a charge of $1 for the first 12 kw.-hr., 7 cents for the next 28, 5 cents for the next 60, 3½ cents for the next 100 and 2 cents per kw.-hr. for all in excess of 200 kw.-hr. a month. The present residential rate combines a fixed charge of $1 per meter per month with energy charges of 5½ cents per kw.-hr. for the first 50, 5 cents for the next 150 and 3 cents per kw.-hr. for all in excess of 200 kw.-hr. per month.

•

Georgia Seeks REA Loan

A $200,000 loan will be sought from the REA by a Cobb County, Georgia, organization which proposes to construct 200 miles of rural electric lines to serve more than 1,000 homes. L. R. Langley, farm agent, said that power would be purchased wholesale from the Georgia Power Company. A canvass is now being made in twelve Cobb County communities.

It is expected that this program, together with the lines already constructed by the utility, will give modern electric service to almost every farm community of any size in the section.

•

F.P.C. Extends Date for Pacific Gas Rehearing

The Federal Power Commission has changed to July 28 the rehearing scheduled for July 19 on the application of the Pacific Gas & Electric Company for amendment of its license for the project located on the south fork of the American River near Sacramento. The rehearing will be held in Sacramento.

The company seeks the elimination from the license of provisions requiring the construction of a reservoir and the enlargement of capacity of a conduit at such time as the commission might direct, in order to supply adequately the reasonable market demand for power in that area. Commission denied this request in March this year.

•

Postpone Stock Auction

The sale at auction of 712,411 shares of Jersey Central Power & Light Company common stock has been postponed until August 13, pursuant to the provisions of a temporary injunction obtained by the company. The common shares are collateral of debentures of National Public Service Corporation.

•

Award Diesel Engine Contract

A contract totaling $150,000, covering four 1,000-hp. Diesel engines, has been placed with the Worthington Pump & Machinery Corporation by the O'Okiep Copper Company, Ltd., O'Okiep, Namaqualand, Union of South Africa. The contract includes all station auxiliaries, comprising complete equipment to provide power for the entire copper property now being opened.

•

New Line for Washington

Puget Sound Power & Light Company has completed surveys for a proposed 55,000-volt power line from Balfour to Sumas, a distance of 12 miles. Estimated cost of the line is $23,000.

Changes Announced in REA Projects

The following changes in project status have recently been announced by REA:

Loan Contracts

LOUISIANA—Valley Electric Membership Corporation, Natchitoches, may use up to $390,000 to build 401 miles of line to serve 1,546 customers.

WEST VIRGINIA—Harrison Rural Electrification Association, Clarksburg, $211,000, 196 miles of line, 743 customers.

ALABAMA—Cullman County Electric Membership Corporation, $34,000 to build a third section of about 35 miles of line to serve 212 customers in Cullman and Winston counties. This project is being built by TVA.

ARKANSAS—Farmers Electric Co-operative Corporation, Newport, $189,000, 130 miles of line, 390 customers. Woodruff Electric Cooperative Corporation, Augusta, $188,000, 191 miles of line, 902 customers.

SOUTH DAKOTA—Lincoln-Union Electric Company, Alcester, $208,000, 192 miles of line, 500 customers.

TENNESSEE—Duck River Electric Membership Corporation, Shelbyville, may use up to $379,500, 387 miles of line, 1,687 customers.

Construction Contracts

KENTUCKY—Salt River Rural Electric Cooperative Corporation, Bardstown, contract to Miller Baxter, Indianapolis, 330 miles of line, 1,164 customers. Negotiations are under way to secure wholesale power from the Kentucky-Tennessee Light & Power Company, Kentucky Utilities Company or the Louisville Gas & Electric Company, but no decision has been reached as yet.

NEBRASKA—Polk County Rural Public Power District, Stromsburg, contract to Sandberg and Johnston, Iowa Falls, Iowa, 350 miles of line, 768 customers. Wholesale power will probably be supplied by the Loup River Public Power District. Burt County Rural Public Power District, Tekamah, contract to Jenson Construction Company, Kimballton, Neb., 253 miles of line, 512 customers. Wholesale power will probably be supplied by the Loup River Public Power District.

OHIO—Holmes Rural Electric Cooperative, Inc., Millersburg, contract to Monroe Electric Company, Chicago, 266 miles of line. Negotiations are being made to secure wholesale power from the Central Ohio Light & Power Company or the Orville Municipal plant, but no decision has been made as yet. North Western Electric Cooperative, Inc., Montpelier, contract to Miller Baxter Company, Indianapolis, 260 miles of line, 1,000 customers. Wholesale power will probably be supplied by Montpelier Light & Power Company.

WISCONSIN—Oconto Electric Cooperative, Gillett, contract to L. G. Arnold, Inc., Eau Claire, 313 miles of line, 1,000 customers. Wholesale power will probably be supplied by Union Falls Power Company.

Allotment

ILLINOIS—An additional allotment of $300,000 has been made for the 26 Iroquois project. These funds are available through the rescission of an allotment previously made to a project in another state which was unable to utilize the funds before the end of the fiscal year. When brought to its full extent, this project will call for an expenditure of more than $1,000,000 to build over 1,200 miles of line to serve 4,000 customers and will include a generating plant. Lines will be built in Ford, Iroquois, Livingston, Vermillion and McLean counties.

Commercial Cooking Council Is Organized

The Food Service Equipment Section of the National Electrical Manufacturers Association and the Commercial Sales Subcommittee of the Edison Electric Institute have joined in a cooperative movement to advance the sale of commercial cooking equipment. Immediate efforts will be placed on the promotion of counter cooking equipment, as it is felt that this offers the fastest approach to the problem.

P. M. Alden, Philadelphia Electric Company, is chairman of the council and Bruce Fleming, N.E.M.A., is secretary. The plan committee, which is preparing promotional material, including a plan book, direct mail pieces and a news sheet, is composed of the following: B. M. Riker, Rockland Light & Power Company; Ernest Laws, Philadelphia Electric Company; T. I. Messenger, Buffalo, Niagara & Eastern Power Corporation; Robert Arnold, the Silex Company; M. E. Miner, Griswold Manufacturing Company, and J. M. Welch, Edison General Electric Appliance Company.

Manufacturers supporting the activity include: Edison General Electric Appliance Company, Griswold Manufacturing Company, Hamilton Beach Company, Landers, Frary & Clark, McGraw Electric Company, the Silex Company and Wells Manufacturing Company.

•

TVA Power for Third Co-op in West Tennessee Area

With the energizing last week of 50 miles of rural line serving more than 100 customers in northern Madison county (Tenn.), TVA began supplying power to the third large West Tennessee rural electrification project, the Southwest Tennessee Electric Membership Corporation.

It is expected that at least 125 miles of line will be energized this month. Eventually the co-operative will serve 1,100 rural customers over 275 miles of line in Madison, Haywood and Tipton counties.

•

Buffalo Range Show

The sale of 91 ranges and the securing of 687 live prospects is reported for the recent Electric Range Show held at Buffalo under the sponsorship of the Electrical League of the Niagara Frontier. Credit for these results and for the attendance of 38,000 reported for the week is given largely to light bill inclosures, two of which were sent to each of approximately 180,000 customers. One electric range was given away each day of the show.

•

Utility Changes Name

Edison Electric Illuminating Company of Boston advises that the name of the company has been changed to Boston Edison Company, as of July 15, as provided by the Massachusetts Legislature and approved by the Governor.

Meetings

International Association of Electrical Inspectors — Joint annual meeting, northwestern and southwestern sections, Hotel Utah, Salt Lake City, August 23-26, F. D. Weber, secretary-treasurer, northwestern section, P.O. Box 70, Portland, Ore. H. L. Gerber, secretary-treasurer, southwestern section, 914 Merchants Exchange Building, San Francisco, Cal. Eastern section, Hartford, Conn., September 27-30, Joseph P. Rohan, general chairman, Hartford Building Department, Hartford, Conn.

American Institute of Electrical Engineers—Pacific Coast convention. Spokane, Wash., August 30-September 3. Middle Eastern District, Akron, Ohio, October 13-15, H. H. Henline, national secretary, 33 West 39th St., New York, N. Y.

Pennsylvania Electric Association—Annual convention, Bedford Springs Hotel, Bedford, Pa., September 8-10. Harold A. Buch, secretary-treasurer, Telegraph Building, Harrisburg, Pa.

Illuminating Engineering Society—Annual convention, Greenbrier Hotel, White Sulphur Springs, W. Va., September 27-30. A. D. Cameron, general secretary, 51 Madison Avenue, New York, N. Y.

Iron and Steel Exposition—Sponsored by the Association of Iron and Steel Engineers, Stevens Hotel, Chicago, Ill., September 28-October 1. Brent Wiley, managing director, Empire Building, Pittsburgh, Pa.

Indiana Electric Association — Annual meeting, French Lick Springs, Ind., September 30-October 2.

Chicago Exposition of Power and Mechanical Engineering — International Amphitheatre, Chicago, Ill., October 4-9.

Electrochemical Society — Fall meeting, St. Louis, Mo., October 13-16. Colin G. Fink, secretary, Columbia University, New York, N. Y.

American Welding Society—Annual meeting and welding exposition, Atlantic City, N. J., October 18-22. Warner S. Hays, managing director, 29 West 39th St., New York, N. Y.

New Sections Formed by General Electric

Four district business units, known as sections, have been formed by the General Electric Company in the organization changes in the specialty appliance sales division of the appliance and merchandise department.

According to G. J. Chapman, division manager, the following changes have been made:

A. M. Sweeney, manager of domestic refrigeration sales section; W. F. Landmesser, manager of commercial refrigeration sales section; W. T. Christy, manager of range and water heater sales section, with J. R. Poteat as sales manager, and G. D. Kobick, manager of dishwasher, Disposall and unit kitchen sales section, with C. J. Enderle as sales manager. Edwina Nolan is manager of the newly formed home service section. R. C. Cameren is assistant manager of the specialty appliance sales division.

Other section managers with important duties serving the specialty appliance sales division include A. L. Scaife, advertising and sales promotion; N. B. Ronning, distribution; W. M. Timmerman, commercial engineer; H. H. Bosworth, central station; W. C. Noll, product; C. G. Smith, credit and financial, and H. P. Smith, auditing.

•

N.E.M.A. Range Group Named

A sales committee to map out sales strategy and methods of approach to be used by electrical range manufacturers was appointed at the recent meeting of the electric range section of the National Electrical Manufacturers Association. Members of the committee include Reese Mills, Westinghouse Electric & Manufacturing Company; D. C. Marble, Edison General Electric Appliance Company; and A. L. Smith, Walker & Pratt Manufacturing Company.

•

Tuttle and Kift Organized

Resigning from their respective positions as works manager and assistant works manager of the Edison General Electric Appliance Company, W. R. Tuttle and D. B. Kift have established the firm of Tuttle & Kift, Chicago, to act as consultants on electric and gas range and other appliance production problems.

•

General Electric Photograph

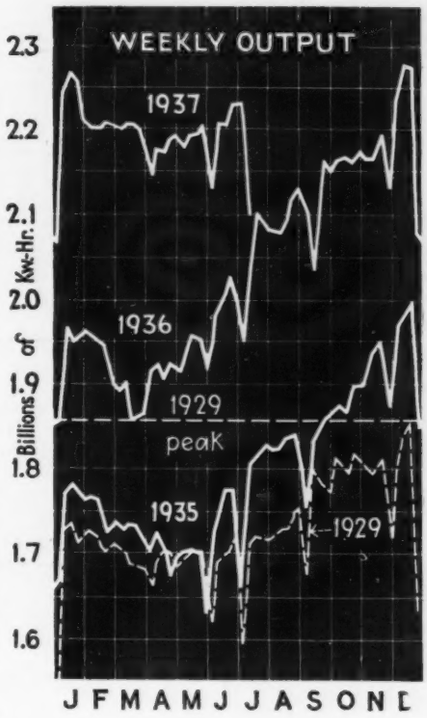
The photograph on page 6 of the June 26 issue of ELECTRICAL WORLD, showing road lighting in Troy, N. Y., was by General Electric Company, which designed the lights.

Holiday Brings Sag in Output

Drop in production larger than in other years — Holiday a factor

Output of the electric light and power industry during the week ended July 10, which included Independence Day, fell off sharply compared with the preceding week, but left a gain of 7.2 per cent over the holiday week a year ago. The estimated total as announced by the Edison Electric Institute was 2,096,266,000 kw.-hr.

The recession, while normal as to its occurrence, was larger than in other years; it amounted to 142,000,000 kw.-hr., as against 73,000,000 in 1936, 117,000,000 in 1935 and 131,000,000 in 1929. In partial explanation, the holiday this year entailed the loss of a full working day, whereas in 1936 it came on a Saturday. Compared with 1929, the decrease when expressed in per cent was smaller in 1937 than in that year—6.3 per cent against 7.6 per cent.



Weekly Output, Millions of Kw.-Hr.

1937		1936		1935	
July 10	2,096	July 4	1,956	July 6	1,655
July 3	2,238	June 27	2,030	June 29	1,772
June 26	2,238	June 20	2,005	June 22	1,775
June 19	2,214	June 13	1,990	June 15	1,743
June 12	2,214	June 6	1,945	June 8	1,724
June 5	2,131	May 30	1,922	June 1	1,629
May 29	2,207	May 23	1,955	May 25	1,696

Per Cent Change from Previous Year

Region	Week Ending July 10	July 3	June 26
New England	+ 1.5	+13.1	+10.4
Middle Atlantic	+ 5.8	+12.0	+11.3
Central Industrial	+ 8.3	+11.8	+12.7
West Central	+ 0.7	+ 3.5	+ 7.1
Southern States	+10.0	+12.5	+13.1
Rocky Mountain	+22.2	+14.9	+10.0
Pacific	+ 7.8	+ 9.2	+ 5.9
United States	+ 7.2	+10.3	+11.6

Boulder Dam Power Rate Change Sought

Faced with the unexpected power problem which has developed at Boulder Dam and the contracts, which were designed to make the federal project self-supporting and self-liquidating within fifty years, members of the California and Nevada congressional delegations have requested the House committee on rivers and harbors to make it possible, in the pending Bonneville Dam bill, for changes in Boulder power and interest rates.

It is proposed to have the interest rate, charged by the federal government on Boulder indebtedness, changed from 4 to 3 per cent, in order to bring the rate closer to the actual cost of money. By this change it is expected that power rates can be lowered.

Proposals have also been made whereby the power contractors would be relieved of the interest and amortization charges on the $25,000,000 charged to flood control after other features had been paid for. The amendment to the Bonneville bill would permit Arizona and Nevada to accept a fixed annual payment of $300,000 each in place of the present 18.75 per cent of the potential surplus over amortization and interest charges.

It is also proposed that Boulder be allowed to allocate power, flood control, navigation, etc., much in the same manner as TVA and Bonneville so that power rates can be reduced.

•

Argentina Output Higher

Production of electrical energy by the two Buenos Aires electric supply companies has shown a consistent increase, year after year, the 1936 total amounting to 1,345,800,000 kw.-hr. The total, in millions of kilowatt-hours, in 1935 was 1,246.6; in 1934 it was 1.199.9 and in 1929, only 828.8. The breakdown, still in millions of kilowatt-hours, for 1936 was: Public lighting, 40.2; private lighting, 348.5; power and traction, 957.1, according to Electric Foreign Trade Notes.

•

British Output Rose 15.3% During Year

Exceeding the output of the preceding year by 2,418,000,000 kw.-hr., or 15.3 per cent, the production of electricity in plants for public supply in Great Britain during the year ended March 31, 1936, totaled 18,192,000,000 kw.-hr., the Electricity Commission announces in its detailed annual report.

During the five years following 1920-21 the average annual increase amounted to 418,000,000 kw.-hr., during the next five years to 603,000,000 kw.-hr. and during the past five years to the end of 1935-36 to 1,195,000,000 kw.-hr. During the latest year sales for power accounted for about 55 per cent, energy for lighting, heating and cooking for over 36 per cent and traction for nearly 7 per cent of the total sales to consumers.

The net total revenue (exclusive of bulk sales) was £76,369,000 (about $377,000,000) in the year 1935-36, an increase of 8.5 per cent over the preceding year. The average price to all classes of consumers was therefore 2.5 cents per kilowat-hour, which is a little higher than the average of 2.3 cents in the United States in 1936. Operating expenses were £40,276,000, against £35,724,000 in 1934-35.

Excess of operating revenue over expenses, plus revenue from other sources, was £38,970,000,000 and represented about 8.1 per cent of the total capital expenditure to the end of 1935-36.

•

Montreal Utility Output Up

Montreal Light, Heat & Power Consolidated reports electricity output for consumption in the Montreal area during June of 89,828,680 kw.-hr., excluding secondary and export power, an increase of 16.35 per cent over a year ago.

Production for the first six months this year totaled 566,361,710 kw.-hr. compared with 530,955,130 kw.-hr. for the corresponding period in 1936, an increase of 6.67 per cent.

Utility Stocks Continue Upward Trend

Utility stocks continued their gains of the previous week, the "Electrical World" index rising a point to 32.9. Index last week, 31.9; year ago, 39.8; 1937 high, 41.5

Consolidated Edison Stock Plan Approved

Stockholders of Consolidated Edison Company of New York, Inc., last week approved the plan of the company to engage in the steam business and to guarantee $25,000,000 of 3½ per cent bonds of Westchester Lighting Company, an affiliate. More than 70 per cent of the stock voted for the proposals.

Edison plans, and has been authorized by the Public Service Commission, to exchange one share of its $5 preferred stock for each share of $7 preferred of New York Steam Corporation and nine-tenths of a share of $5 Edison preferred for each share of $6 preferred of Steam.

The original proposal of exchange of share-for-share plus $10 for the $7 Steam preferred was rejected by the commission.

Westchester Lighting has filed with the SEC the proposal to issue $25,000,000 of 3½ per cent series, due 1967, bonds. Proceeds will be applied to the repayment of $25,100,000 of advances payable to Edison.

•

Manning Bowman Plans Issue of 30,342 Shares

Manning Bowman & Company, Meriden, Conn., electrical appliance manufacturers, recently filed with the SEC registration statement covering 30,342 shares of $10 par stock. Distribution of the issue gives B. M. Tassie, president, an option on 5,000 shares at $10 a share. Stockholders will be offered 25,044 shares, while 388 shares will be optioned to employees at $10 each.

All shares not subscribed will be taken by the International Silver Company, which already has an interest in the company. Proceeds of the issue will be used against outstanding bank loans.

•

Applications Filed With Commission

Among the recent statements filed with the Securities and Exchange Commission are the following:

Associated Gas & Electric Company has filed a request to withdraw a registration statement filed on March 30, covering $10,000,000 of 5 per cent debentures due in 1952 to be exchanged for outstanding securities.

Interstate Light & Power Company, Galena, Ill., has filed a notification of registration under the Holding Company Act. The company is a subsidiary of Northern States Power Company of Minneapolis, of the Standard Gas & Electric Company system.

Middle West Service Company has been exempted from the provisions of Section 6 (a) of the Public Utility Holding Company Act of 1935 of the issue and delivery to the Middle West Corporation of its unsecured 4 per cent notes payable in the principal amount of $75,000.

•

Plan Additional Stock Issue

Narragansett Electric Company has filed with the SEC a certificate for registration of 40,000 additional shares of stock to be issued to Rhode Island Public Service Company, parent company, for $2,000,000. Proceeds to be used to retire current indebtedness from plant expansion.

•

Kansas Electric Power Plans $500,000 Issue

The Securities and Exchange Commission has set July 28 as the hearing date for the declaration of the Kansas Electric Power Company on the issue and private sale of $500,000 of first mortgage bonds, Series A, 3½ per cent, due December 1, 1966.

Proceeds of the issue are to be used primarily in paying the cost of construction of about 60 miles of high-tension transmission line with substations and equipment, together with other additions and improvements. The company has orally agreed to sell the bonds at private sale to Travelers Insurance Company of Hartford, Conn., at 91⅜ per cent of the principal amount.

•

Middle West Corporation Elects 3 New Directors

At the recent annual meeting stockholders of the Middle West Corporation elected three new directors and approved a change in the meeting date from the first Tuesday in July to the third Tuesday in April.

The new directors are: Martin Lindsay, Chicago, vice-president Telephone Bond & Share Company and formerly chairman of the Middle West Utilities common stockholders' committee; E. A. Olsen, Chicago, vice-president Middle West Service Company; Charles K. Wilmers, connected with the Sofina Corporation, a Belgian concern, who has just moved to Chicago.

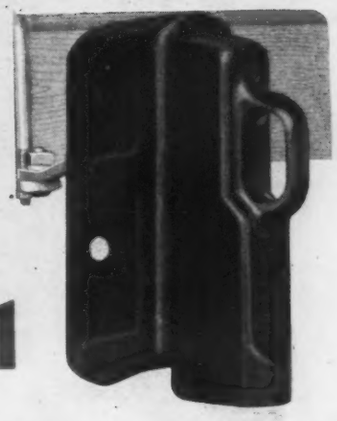
Earnings Reports (Utilities)

	Net Income 1937	1936
*Puget Sound Pwr. & Lt. and subs.	$1,798,062	$1,434,314
*Virginia Elec. & Pwr.	3,289,763	3,067,176
*California Oregon Pwr.	1,109,652	739,070
*San Diego Cons. Gas & Elec.	1,441,116	1,337,766
*Engineers Pub. Serv. and subs	3,215,572	2,330,675
*Connecticut Lt. & Pwr.	4,682,780	4,574,305
*Amer. Lt. Traction and subs.	5,995,568	4,815,454
*Continental G. & E. and subs.	4,543,353	3,906,657
*Eastern Util. Assoc. and subs.	1,966,966	1,846,528
*Indianapolis Pwr. & Lt. and subs.	1,706,640	1,295,617
*United Lt. & Pwr. and subs.	5,275,626	3,480,045

*Twelve months ended May 31.

LOOK!

YOUR "BIGGEST BUY" IN CUTOUTS



1

A New G-E Reclosing Fuse Cutout

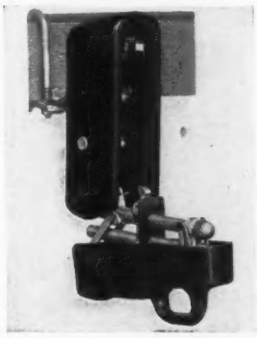
LOW PRICE—Here is a cutout that restores service one second after a temporary fault, and is so low in first cost that it can pay for itself the first time it recloses a circuit.

BEST NEWS OF ALL—Operating companies can obtain this reclosing feature for any of their G-E 50-ampere enclosed indicating and drop-out fuse cutouts now in service or in their warehouse—simply by removing the present door and putting on the new reclosing door.

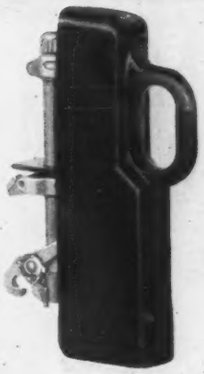
HOW IT OPERATES

The new cutout restores service after a temporary fault, by means of a second fuse link which is automatically connected in the circuit after the first fuse link blows. The interruption is so brief that motors and other devices will continue in service.

When the first fuse link blows, the door is pushed outward at the bottom, indicating that the fuse link has blown, that the fault has been cleared, and that service has been restored.



In case of a permanent fault, both fuse links blow, with a one-second time delay between, and the door drops open.



2

A Door for Converting G-E 2-in-1 Cutouts to Reclosers

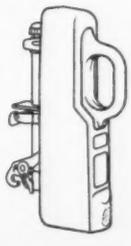
HOW YOU SAVE

Because you save one special trip by the service truck and because you gain the revenue that would otherwise be lost during the service outage, the new reclosing cutout can pay for itself the first time it restores service after a temporary fault. Why not investigate the possibilities for service improvement and economy offered by the new reclosing cutout. Available in 50-amp ratings at 5000 volts and 7500/12,500 gr-Y volts. General Electric, Schenectady, N. Y.

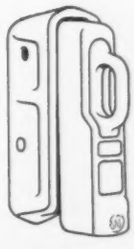
THE DOOR DOES IT

From a G-E 50-amp indicating and dropout cutout, remove the door....

Put on the new reclosing door....



And you have a reclosing cutout



340-31

GENERAL ELECTRIC

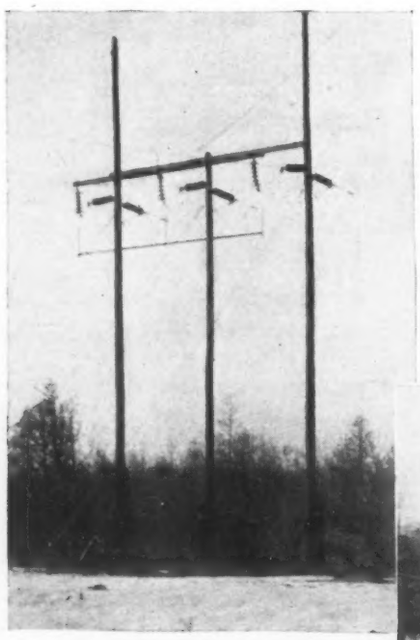
Field OPERATING PRACTICES

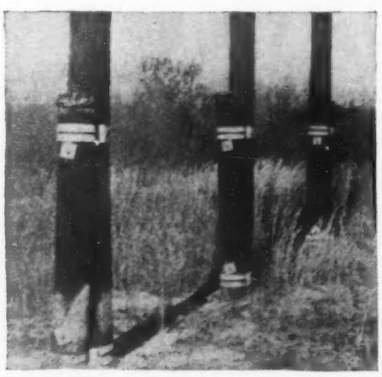
New ideas and practices in the operation of well-designed, constructed and maintained plants and systems

Swamp Poles Stubbed to Driven Piles

By RAYMOND HUNT
General Superintendent
Tidewater Power Co., Wilmington, N. C.

Running a 110-kw. wood-pole line through a swamp with 18 ft. of silt and a matting of reed and brush on top presented somewhat of a problem of pole setting. The contractor who undertook the job mounted a pile driver on a small scow and then dragged the scow to successive pole locations by means of a gasoline winch anchored to stumps. Creosoted piles were driven down to refusal at 16 to 18 ft. and then the 45-ft. creosoted poles were stubbed to the projecting piles. Fifteen structures guyed four ways were erected in this manner across the 9,150-ft. stretch of swamp involved in the 46.8 miles of the line. The same scow was dragged back across the swamp with the wire reels on it when the conductors were strung.





Pile driver on scow sets swamp pole stubs

•

Locating Manholes in Underground Systems

It is difficult to establish strict rules for manhole locations, because there will always be obstructions over which the utility owning or operating the underground system has no jurisdiction. Yet it is well to have rules to be used as a general guide and then to adjust the design to existing obstruction. The Detroit Edison Company uses the following general rules:

Manhole Location—Manholes shall be located at such points as to conform best with the following requirements:

1. So as to be not over 450 ft. apart along the conduit.

2. So that the curves or bends in the conduit between manholes or in laterals will not exceed the maximum determined from the following rule: *Rule for maximum allowable total of curves or bends.*

In main conduit, the product of the total deflection from a straight line, in degrees, and the length between manholes, in feet, shall be not greater than 9,000. The radius of any curve shall be not less than 50 ft.

Example—A 90 deg. curve (radius 50 ft.) in 100-ft. length—90 x 100 = 9,000.

A 30 deg. curve (radius 50 ft.) in 300-ft. length—30 x 300 = 9,000

In laterals, if containing only one bend the product of the total deflection from a straight line, in degrees, and the length in feet, shall be not greater than 18,000. The radius of any bend shall be not less than 3 ft.

Example—A 90 deg. bend in 200 ft.—90 x 200 = 18,000

If containing *two bends* the product of the total deflection from a straight line, in degrees, and the length in feet, shall be not greater than 11,000. The radius of any bend shall be not less than 3 ft.

Example—A 20 deg. bend and a 90 deg. sweep in 100 ft. (90 + 20) 100 = 11,000

Five-foot radius bends are to be used for *diverting conduits* of the regular run in a horizontal plane for service to customer.

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Glass Rectifiers for Heavy Duty

By C. T. HURD
Allis-Chalmers Manufacturing Company, Seattle, Wash.

Basing its decision on experience gained over the past five years with glass tube rectifiers installed to lighten the load on its direct current system, the British Columbia Electric Railway Company last year installed a 333-kw., 600-volt rectifier for railway service;

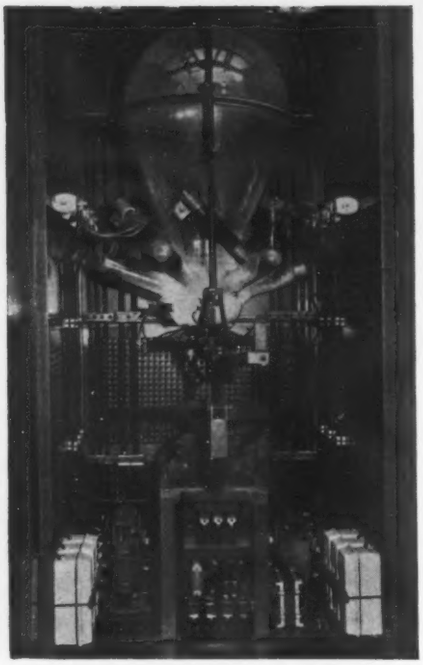
ALL ASSEMBLED—COMPLETE—READY TO RUN

Why Not Get Switchboards the Same Way?

YOU can get switchboards today just as you get an automobile—shipped assembled. A modern G-E switchboard comes with every device in place and connected—ready to use. You simply bolt it to the foundation and connect the cables. There's a real saving in cost of installation. A modern G-E switchboard is styled for modern appearance. It is streamlined, with all the devices semiflush—built-in, not hung on. It has character, embodying workmanship that is possible only under expert supervision, and in a factory where the necessary machinery is available. Ask our nearest office to quote on your next switchgear requirements. General Electric, Schenectady, New York.

880-15

GENERAL ELECTRIC



Six-phase, glass tube, mercury-arc rectifiers used for railway service

Note the fan operating in the horizontal plane below the tube to provide cooling.

the rectifier consists of two glass tube rectifiers, shown in the accompanying illustration, operating in multiple. Built for diametrical six-phase operation, the rectifier tubes are blown by lung power. The over-all height of the tubes is 4 ft.

A unique cooling arrangement is provided by means of a fan installed below the tube. This fan is connected to a variable speed motor energized from a series reactance in the circuit. Thus the speed of the fan and the cooling effect is proportional to the load on the rectifier.

•

Check Interference in Transformer Shop

Bushings on transformers are sometimes discovered to be sources of radio interference. And to make such a discovery on a transformer in service is not pleasant because the interference will already have caused a certain amount of peevishness among neighboring customers and the cost of correcting it will be an expense all the more painful because it is preventable.

The way to guard against radio interference of the "leaky transformer" type is to be sure that transformers are not "leaky" when they are put into service. Modern transformers are usually free of such trouble; it is the old ones which still survive in very considerable numbers on almost every electrical distribution system that once in a while make the neighborhood radios sputter and fry. It is these older transformers that furnish the large volume of business for the transformer repair shop, and in the shop is where they should be checked for radio interference before being returned to a pole in the system.

In the test set-up of the Oklahoma Gas & Electric Company, where repaired transformers are given the "high pot," there is included a radio set which is turned on when a test is made. Any bushing or other leakage is revealed by the characteristic sound from the loud speaker. The radio set is in no way special nor is it modern. In fact, it is about as ordinary a one as can be found and of about 1930 vintage. This selection was deliberately made because it is the older receivers, still very commonly used, that are most susceptible to interference. It was felt that if a transformer under high potential test did not raise a squawk from this old timer it would not be likely to disturb the reception when excited at normal line voltage.

UNIFORM RECORDS FOR TRANSFORMERS, BREAKERS AND GENERATORS

DUKE POWER COMPANY
TRANSFORMER RECORD

STATION

KVA. EACH	MAKE	TYPE	VOLTAGE	CONN. PRINT. NO.	D. P. CO. NO.

SERIAL NO.s | IMPEDENCE | TEMP

CONNECTED: | PUT IN SERVICE:

OPERATING RECORD	OIL TEST	CONNECTIONS CHANGED			
		From	To	Date	By

DUKE POWER COMPANY
GENERATOR AND EXCITER RECORD

STATION

MANUFACTURER	SERIAL NUMBER AND TYPE	KVA	RPM	VOLTAGE	ARM AMPS	FIELD AMPS	NO. POLES	NO. COILS

EXCITER	SERIAL NO AND TYPE	KW	VOLTS	AMPS	RPM

PUT IN SERVICE | DIFFERENTIAL AND INSULATION TESTS

OPERATING RECORD	DATE	BEARING	TEMP	WEATHER	DIFF	VOLTAGE	ARM	FIELD

DUKE POWER COMPANY
OIL CIRCUIT BREAKER RECORD

Station
In service on

Manufacturer | Volts | Amps.
Type | Style or SO Number | Serial
Bushing—Type | Arc Shields—
Current Transformers | Number | Ratio
Control | Voltage | Closing Current
Mounting | Number of Bushings with potential device tap

	BUSHING TESTS—Oil or Potential								OIL TESTS			OPERATING RECORD
	Tank 1	Tank 2	Tank 3	Date	Tank 1	Tank 2	Tank 3	Date	Tank 1	Tank 2	Tank 3	
Line												
Bu												
Line												
Bus												
Line												

AUTOMATIC OPERATIONS

1 7	2 8	3 9	4 10	5 11	6 12
1 7	2 8	3 9	4 10	5 11	6 12
1 7	2 8	3 9	4 10	5 11	6 12

For the purpose of keeping a continuous maintenance record of the location, rating, periodic tests, duty and other essential data on major apparatus the Duke Power Company uses the above forms.

On the transformer card a record is kept of all changes in location, internal connections, overhaul, oil tests, internal inspection, date painted, etc., with the operating record.

On the generator and exciter card, record is kept of bearing insulation tests for stray currents, armature and field insulation tests, brush record, weather condition at the time of test, with the essential data properly to interpret these tests and the operating record.

On the oil circuit breaker card record is kept of all changes in location, duty, oil tests in all tanks, periodic overhaul, bushing tests, with the essential data properly to interpret these tests, date painted, etc., with the operating record.

WHERE SERVICE CONTINUITY IS VITAL

GREATER everyday dependence on the continuity of the service you render makes high quality imperative in the distribution transformers you specify and install. When you balance first cost, maintenance expense, and the continuity factor, you will find in G-E distribution transformers the most satisfactory combination of low operating cost and maximum service performance. General Electric Company, Schenectady, New York.

300-56

GENERAL ELECTRIC

Crossarm Secondary Best for Long Spans

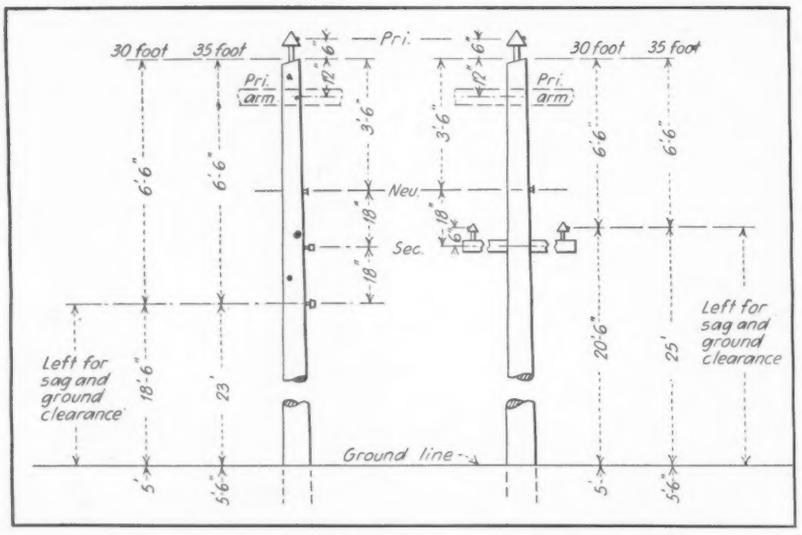
By E. A. BOWMAN
Bowman & Wages, Roxie, Miss.

Many companies are using vertical secondary construction on rural lines and others are turning to it on the theory that it is more economical than crossarm construction. Vertical construction has many favorable features; it requires less right-of-way and tree clearing, it uses the same conductor spacing on straight line and on deadends, etc., and certainly has its place in any extensive construction program. However, in long spans, facts and figures do not justify the abandonment of crossarms for secondary construction. This does not apply to deadend structures because every deadend should be on the pole if possible, particularly the new high-strength rural conductors. Nor does this cover lines where the span limitation, due to other reasons, leaves sufficient clearance for any type of construction. The reference is to the new type long-span common-neutral rural lines built with light poles and highly stressed conductors carefully designed to utilize every foot of pole space available after allowing the minimum National Electrical Safety Code ground clearance.

The accompanying sketches show typical straight line rural structures of the vertical and crossarm type and give the conductor spacings and the resulting ground clearances, at the pole, for 30- and 35-ft. poles.

The table, columns, 1, 2, 3 and 4, gives the maximum level ground span obtainable with these pole clearances in the light loading district. From columns 7 and 8 it can be seen that after allowing code ground clearance the use of crossarms permits an average span increase of about 27 per cent with 30-ft. poles and 14 per cent with 35-ft. poles. The increased wire separation obtainable with arms will allow the span increase, and will also permit a lessening of the vertical spacing required at deadends, thus preventing a pole height increase or a severely shortened deadend span. It might also be pointed out that in rolling country the wire separation on crossarms will allow an even greater average span increase, whereas with vertical spacing the conductor spacing must be increased over that shown, with consequent loss of pole height or spans will be limited by the spacing between conductors. With premium-priced extra-high-strength conductors being recommended for rural use because they make available increased span lengths, it seems rather contradictory to use them on structures that fail to take advantage of other more economical means of securing long spans.

From columns 13 and 14 in the table it is seen that the reduction in structures per mile required for crossarm construction under that required for vertical configuration ranges from as many as 4.0 with 30-ft. poles to 1.2 with 35-ft. poles. This decrease in the number of structures will more than offset the additional cost of the necessary arms and any normal amount of added right-of-way clearing, especially if the right-of-way must be cleared anyway for three-phase primary conductors. Conceding that there is a depreciation and maintenance factor in crossarms that is not present in secondary brackets, an $8 to $12 lower original expenditure will more than balance the scales in favor of crossarm secondary supports.



Better clearances and longer spans by using crossarms

Oil-Filled Reactors Protect Transformers

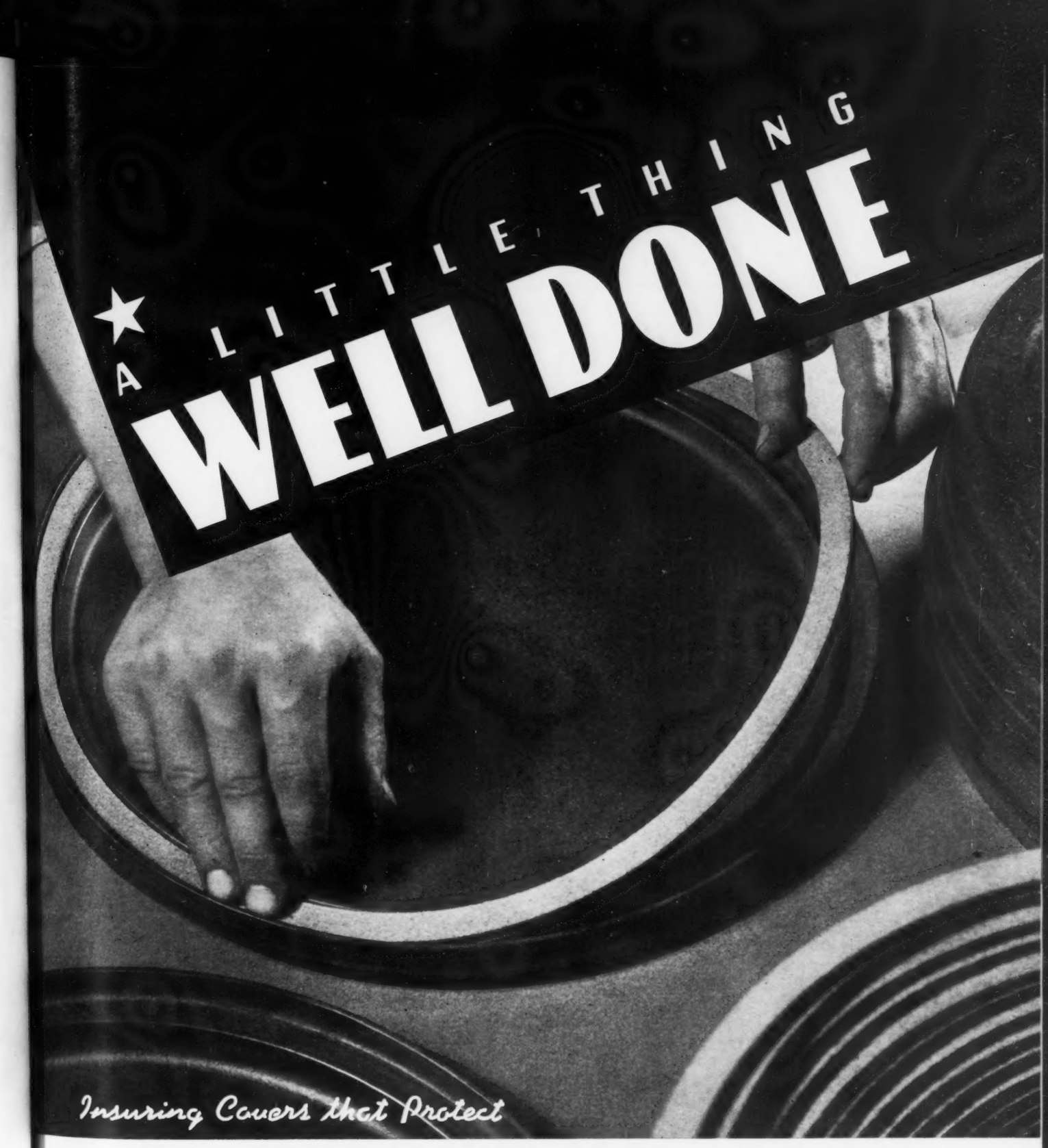
The growth of the British grid system has involved increased fault currents, and incidentally, headaches to the operators because of the limited interrupting capacities of existing switching equipment. Reactors, frequently of the outdoor oil-filled type, even in the lower voltage classes, and high-reactance transformers are remedial measures that have been applied, according to the English *Electric Journal* for March, 1937.

"Bucholz" protectors are commonly used to guard against internal faults, and in the North Road distribution center of the Brighton Corporation Electricity Undertaking a water sprinkler system provides protection against external oil fires. It is claimed that a strong spray of water impinging on the oil surface will cause the emulsification of a thin layer of oil almost instantaneously. The result is that the fire is extinguished within a few seconds after the water is turned on.

Crossarms vs. Brackets for Rural Secondaries

No.	Maximum Span Obtainable With: Vertical Const. 30-Ft. Pole 1	Vertical Const. 35-Ft. Pole 2	Crossarm Const. 30-Ft. Pole 3	Crossarm Const. 35-Ft. Pole 4	Additional Span Length Obtained With Crossarms: 30-Ft. Pole 5	35-Ft. Pole 6	Per Cent Inc. in Span Length Due to Using Crossarms: 30-Ft. Pole 7	35-Ft. Pole 8	Approx. Number of Structures per Mile on Level Ground: Vertical Const. 30-Ft. Pole 9	Vertical Const. 35-Ft. Pole 10	Crossarm Const. 30-Ft. Pole 11	Crossarm Const. 35-Ft. Pole 12	Reduction Possible in No. of Structures per Mile: 30-Ft. Pole 13	35-Ft. Pole 14
6 HD Cu	270	415	340	470	70	55	26	13	19.5	12.7	15.5	11.2	4.0	1.5
4 HD Cu	270	410	340	360	70	50	26	12	19.5	12.9	15.5	11.5	4.0	1.4
6A Cwld	310	485	390	555	80	70	25	14.5	17.0	10.9	13.5	9.5	3.5	1.4
4A Cwld	305	480	390	540	85	60	28	12.5	17.3	11.0	13.5	9.8	3.8	1.2
4–6/1 ACSR	300	480	390	550	90	70	30	14.5	17.5	11.0	13.5	9.6	4.0	1.4
2–7/1 ACSR	310	495	395	565	85	70	27	14.0	17.0	10.6	13.3	9.3	3.7	1.3
2–6/1 ACSR	300	470	385	540	85	70	28	15.0	17.5	11.2	13.7	9.8	3.8	1.4
2–7/1 ACSR	310	490	390	560	80	70	28	14	17.0	10.8	13.5	9 4	3.5	1 4

Cu. Maximum tension not to exceed 60 per cent of ultimate strength. Cwld. Maximum tension not to exceed 65 per cent of ultimate strength.
ACSR Maximum tension not to exceed 60 per cent of ultimate strength.



on L-M DISTRIBUTION TRANSFORMERS

● The oil stays inside L-M Transformers . . . and moisture stays out. L-M covers are rigid cast iron, uniformly tight-fitting. A cork gasket is carefully fitted into the double-ridged channel seat on every L-M cover, making sure that your L-M Transformer is both oil-tight and moisture-proof. Another of the many "little things well done" to make L-M Transformers give more years of service. Write to South Milwaukee, Wisconsin, for transformer information.

LINE MATERIAL CO.

Industrial ELECTRIFICATION

New ideas and practices in industrial electrification as presented by industrial, consulting and power sales engineers

Control Heating Bath Within 1 Deg. F.

By DONALD S. BENNETT
Industrial Heating Department,
Worcester Electric Light Company

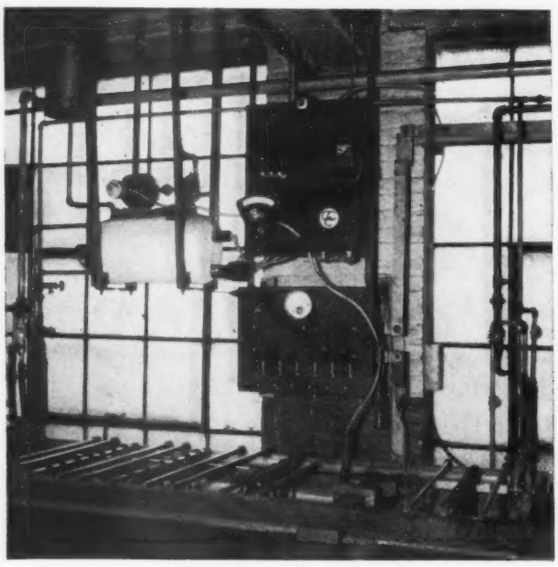
The problem of maintaining an even temperature in nickel-plating tanks at the plant of the Electrotype Service Company, Worcester, Mass., has been effectively solved by an electric heating installation utilized in combination with a water circulation system. As the company has used electrically heated lead pots, wax tables, cutting knives, etc., for the past four years, it brought the question of securing uniform temperatures in its plating tanks to the local electric light company. At first the solution seemed quite simple. It was necessary to maintain 85 deg. F. in the tank for wax frames and 95 deg. in the tank for lead frames. When due consideration was given to the point that the wiring code requires the case of heating units to be grounded, the feasibility of installing several lead-covered immersion heating units directly in the nickel sulphate plating bath was questioned. It was thought inadvisable to use this method because of anticipated electrolysis between the electroplating elements and the heating units.

By utilizing the lead pipes already installed in the bottoms of the tanks (one of 246 gal. and the other of 63 gal. capacity) the solution was reached. The plan was completely to isolate the heat source from the acid bath and to use water as the heat-conducting medium. An insulated auxiliary hot water tank of 7 gal. capacity was installed and equipped with four 2-kw. immersion heating units, a bulb type thermal control relay switch and piping. On top of the tank is a small centrifugal pump for circulating water between the tank and the lead coils in the plating tanks. Above and connected to the hot water tank is an expansion tank with gage glass and overflow pipe connection to an adjacent sink. The control panel is mounted above a panel carrying six electroplating control switches. Control equipment includes a three-pole, 115–230-volt service switch, a two-pole alternating-current magnetic switch for the pump motor, a two-pole, 230-volt alternating-current magnetic switch for the heating units and a temperature-indicating controller for the plating bath. The heat sensitive bulb of the controller is placed in the electroplating bath, which is being controlled at any particular time, and this is protected from the acid bath by inserting it in a Sonderglass tube filled with water as the heat-conducting medium.

Pipes from the auxiliary water tank are insulated from the lead piping of the baths by rubber hose connections.

Eignar Ringquist, president of the Electrotype company, has expressed satisfaction with the installation as it not only operates at low cost and requires less attention than former methods but the constant temperature held in the electroplating baths results in a more uniform electrotype.

In operation the heat sensitive bulb is placed in the tank to be controlled. Manually closing the main service switch closes the magnetic switch for the pump motor and starts water circulation. At the same time the immersion heating unit switch closes. Heating units remain energized until the water in the auxiliary tank reaches about 160 deg. F. After this initial heat-up the thermal relay mounted on the water tank maintains this temperature at a differential of about 8 deg. plus or minus. When the plating bath reaches the required temperature the heat sensitive bulb in the plating bath causes the indicating temperature controller to open the pump motor switch, thereby stopping the circulation of hot water. Thus there are two separate heat controls—one to control the heat storage in the hot water tank and the other to control the transmission of heat to plating bath. The equipment maintains a temperature differential in the plating of 1 deg. F. plus or minus and the energy consumption during the first year's operation was 3,385 kw.-hr.



Electric water heater with automatic control improves quality of electrotype production

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Maintenance Hints on Oil Switches

By K. B. HUMPHREY
Sayreville, N. J.

Proper maintenance of oil switches used with high-voltage equipment is an important feature of industrial maintenance work. Proper testing and perhaps purification is always desirable, but in ordinary industrial plants,

Controlled Power

Makes the FWD A Safe, Sure-Footed Truck on All Roads!

The best "*showroom*" for the FWD Truck is the great outdoors. There—in mud, sand, loose soils, snow, and on slippery or icy pavements—its *Controlled Power* has won a large and loyal following . . . The famous Four-Wheel-Drive principle — that of equalized power and load distribution — gives the FWD Truck sure, positive traction. It's a safer truck and one that's sure to "get through," regardless of how strenuous the tasks before it may be . . . In FWD construction, a center differential distributes power equally to all *four* driving wheels—and this power is always headed in the same direction in which the driver is steering. It is not operating at cross purposes . . . Test your trucks by their road performance. Put the FWD in the hardest service you have. You'll find it is more reliable—safer—and more economical. *Write us for more specific information pertaining to your own hauling problems.*

FWD Controlled Power Means...

- Greater Safety
- Faster Service
- Greater Dependability
- Wider Range of Operation
- Operating Economy

FWD

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory, KITCHENER, ONTARIO

FOUR-WHEEL-DRIVE **TRUCKS**

THE SAFEST TRUCK ON THE HIGHWAY

testing and purification equipment may not be economically justifiable. A good deal may be accomplished by regular inspection at least once every six months. Special inspections should be made after oil breakers have opened heavy overloads or short circuits. Oil should be changed every six months or at the maximum once a year, under ordinary conditions.

Moisture and carbon are a common source of trouble in oil switches and compensators. If condensation or rust is noticed on the inside of the switch cover the oil should be changed. Also if the switch heats up under load there is frequently considerable moisture and carbon present. Carbon in the oil is easily visible, but it takes considerable experience to judge how much is present. It is better to change the oil too often than run the risk of damage to the apparatus or the operator. Carbon is also indicated by a black deposit on the porcelain insulator bushings. When inspections are being made it is always a good plan to look over connections and bolts to see that they are tight. Badly pitted contacts should be renewed when necessary.

•

THIRTY-FIVE FT.-CANDLES FOR MACHINE SHOP

Westinghouse

To meet the need for ample illumination occasioned by the close and accurate nature of the work, this Eastern machine shop installed 402 400-watt mercury-vapor lamps in Glassteel units to obtain an intensity of 35 ft.-candles.

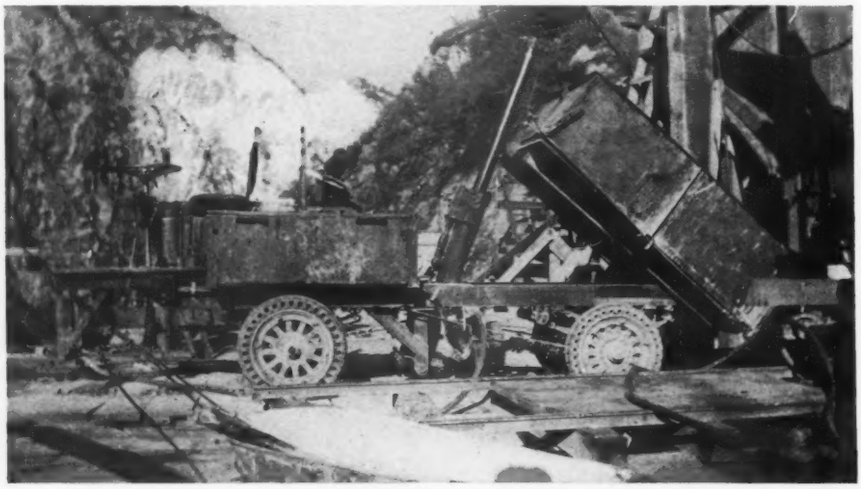
Built Battery Truck for Tunnel Hauls

By G. E. MILLER
Chief Electrician West Construction Company

In pressure grouting one of the sections of the Metropolitan Water District tunnels the problem of transporting 2½ yd. of sand and ten sacks of cement per hour proved formidable as the tunnel could be worked only from one portal. Being 7,800 ft. in length and having a 10-ft. inside diameter, it was felt that trackage costs for a battery locomotive would have been uneconomical due to the short length of time it would be in service.

In searching for a substitute method of transportation, the idea of a battery-driven truck was investigated. However, to be feasible, the truck would have to be both inexpensive and have a narrow gage and it could not be turned in the tunnel. Nothing seemed to be available to meet these specifications so an abandoned milk wagon chassis was secured and the axles narrowed to 36-in. gage. The frame was extended to accommodate a 2-yd. dump body and hoist. The conventional steering gear was retained, but the driver's seat was made movable so he could face the direction of travel both ways.

The chassis was equipped with an 80-amp., 60-volt motor which was powered from a 36-cell Exide battery, formerly part of a locomotive battery having three years previous service. Original solid tires were changed to 30 x 6-in. pneumatics because of the wedging action of the circular roadway. The vehicle could be operated safely at speeds up to 12 m.p.h. in the tunnel and proved to be a very satisfactory piece of equipment for the material-haulage job.



Improvised battery truck used for grouting Metropolitan Water District tunnel
Assembled from parts available on the job, the vehicle successfully substituted for the usual locomotive and trackage system

•

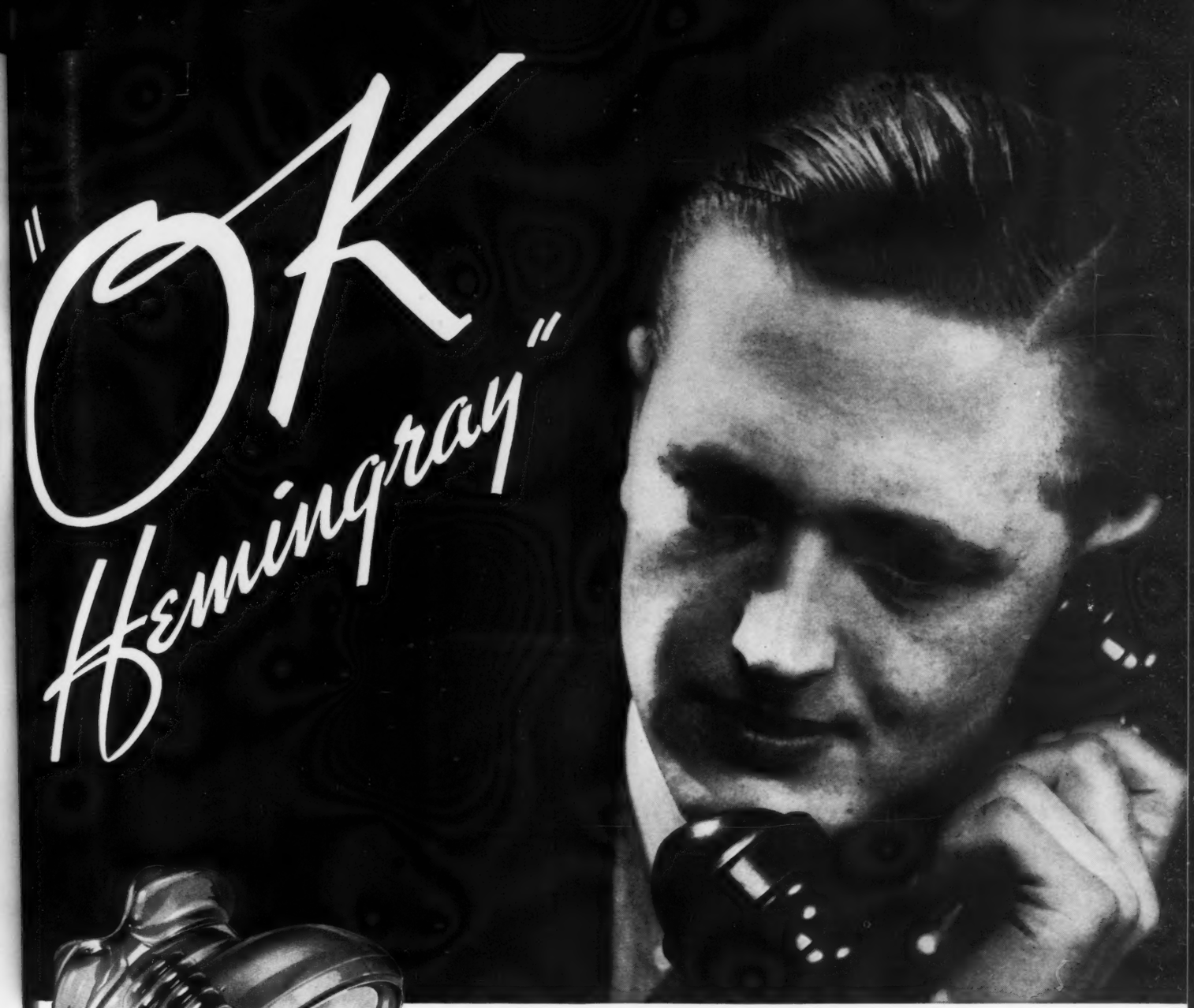
Industrial Power Data Sheet Reprints Available

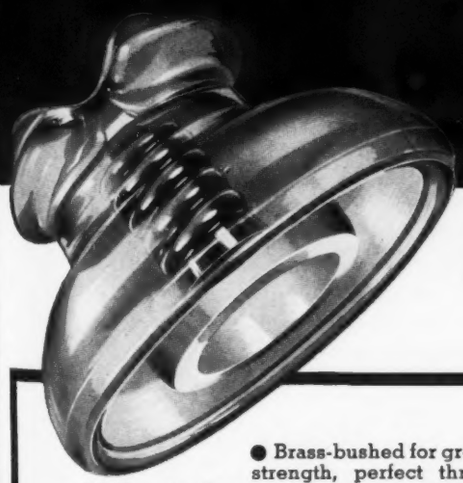
In response to a persistent demand ELECTRICAL WORLD has provided a supply of reprints of the industrial power data sheets covering bakeries, laundries and breweries. Each of the three series consists of ten data sheets on five 8½x11 pages. Prices for sets comprising all 30 data sheets are:

1 to 10 sets	$0.30 per set
11 to 25 sets	0.25 per set
25 or more sets	0.20 per set

Remittance to ELECTRICAL WORLD should accompany the order.

"O K Hemingray"





● Brass-bushed for greater strength, perfect threads and full protection against pin expansion.

● Hemingray provides many advantages: greater mechanical strength . . . sustained dielectric strength . . . unaffected by sudden temperature changes . . . withstands maximum insulator pin expansion . . . never ages or deteriorates . . . controlled uniformity of product . . . all surfaces impervious to moisture . . . tougher — withstands rough handling . . . clear, flawless for easy inspection. Ratings up to 15,000 volts.

MEANS THE END OF INSULATION TROUBLES

● Utility engineers and purchasing agents from coast to coast confidently say, "O K. Hemingray" because this tough insulator abundantly fulfills the requirements of distribution and rural power lines. Characterized by high quality, high efficiency, long life and low cost, Hemingray Brass-Bushed Glass Insulators have become the standard of comparison in performance cost. They are now used by more than 200 power companies to provide dependable service, to lower operating costs and to reduce the original expenditure for insulation equipment.

Their performance in service backs up the judgment of the man who buys them.

If you aren't using the new Hemingrays on your distribution lines, order some today from your jobber, or write for samples and prices. Owens-Illinois Glass Company, Hemingray Division, Muncie, Ind.

FOR MODERN POWER LINE INSULATION

Order HEMINGRAY Glass INSULATORS

Building Up THE LOAD

New ideas and practices in selling electrical equipment and service to commercial and domestic customers

Appliance "Bargain" Plan Nets 61,085 Kw.

The Electric Necessity Bargain Package Campaign, initiated last December by the Consolidated Edison Company of New York, Inc., and affiliated companies, closed March 31. In that time, according to company reports, orders for 50,286 packages were taken by the 400 co-operating dealers and the employees of the companies participating; total connected load represented is 61,085 kw.; total selling price, $811,890.

Campaign was designed to increase the consumption of electricity by the minimum-use customers on the system and offered two groups of appliances at approximately half the regular price, through the co-operation of the manufacturers. Package No. 1, of which 10,362 were sold, included a Westinghouse toaster, rated at 500 watts; a G. E. Hotpoint iron, 575 watts, and a Griest I.E.S. lamp with a 100-watt bulb. It was priced at $8.82. Package No. 2, of which 39,924 were sold, included an a.c.-d.c. radio, 50 watts, in addition to the appliances listed above, and the package was priced at $17.64.

Customers of the company were able to purchase these appliances on a partial-payment basis without any financing charge; non-customers were required to pay cash. Every minimum bill customer of the company—some 350,000—was canvassed.

2 ELECTRIC BARGAINS
Bargain 1
GENERAL ELECTRIC HOTPOINT IRON
WESTINGHOUSE TOASTER
I. E. S. BETTER SIGHT FLOOR LAMP
$8.82
REGULAR PRICE $11.85
Plus 2% City Sales Tax for relief of Unemployed
*Payable 75¢ a month for 12 months
This is less than 2½¢ A DAY
Bargain 2
CADETTE 6 TUBE SUPERHETERODYNE AC-DC RADIO plus the IRON TOASTER LAMP
$17.64
REGULAR PRICE $35.80
Plus 2% City Sales Tax for relief of Unemployed
*Payable $1.50 a month for 12 months
This is less than 5¢ A DAY
NOW YOU CAN AFFORD THEM . . .
AND THEY CAN REDUCE YOUR AVERAGE ELECTRIC RATE TOO!
FOR the first time, you can buy bargain packages of well-known electrical appliances for about half price, and on the easiest terms we've ever known. But not for long. . . . Now you can afford the electrical comfort everybody needs and wants. Each appliance is a famous make of fine quality. If you bought them in the usual way, you'd pay almost double the prices offered here.
Give yourself – your family – one of these bargain treats. And as you enjoy them, enjoy another bargain at the same time—the new step-down electric rates—rates even lower since January 1st. The more electricity you use the lower your average rate tends to be.
*Deferred payments available only to customers of Consolidated Edison Company of New York, Inc., the New York and Queens Electric Light and Power Company, and Westchester Lighting Company. Deliveries limited to the territory of these Companies. Sold to others for cash.
How to get them...
VISIT AN APPROVED DEALER...OR ANY CONSOLIDATED EDISON COMPANY SHOWROOM LISTED AT RIGHT ... OR PHONE FOR ADDRESS OF NEAREST DEALER.
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151 East 86th St. ATwater 2-7600
31 West 125th St. HArlem 7-4500
21 Audubon Ave. WAshington Hts. 7-4200
BRONX
929 Gerard Ave. MOtt Haven 9-7181
555 East Tremont Ave. TRemont 2-6150
330 East Kingsbridge Road KIngsbridge 9-5300
45 Westchester Square UNderhill 3-9500
CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.

SOLD THEM BY THE THOUSANDS—One in seven of the minimum-use customers of Consolidated Edison purchased one of these bargains in a four-month campaign

Air Conditioning Cuts Sick Leaves

Effectiveness of air conditioning in reducing respiratory diseases among employees was revealed in the recent report of a three-year survey in the Tribune Tower, Chicago.

This survey was begun in May, 1933, one year before air conditioning was installed throughout the building. During this twelve-month period a monthly average of 2,150 persons were employed. Of this number, 475 missed a total of 2,228 work days because of colds, influenza and similar infections.

Westinghouse air conditioning was installed on May 10, 1934. During the following year, when an average of 2,500 people were employed each month, 345 workers missed 1,290 days of work, a decrease in employee sickness of some 8 per cent. From May 1 to the end of 1935, 204 out of the 2,800 employees were out of the office because of illness. Even during the influenza epidemic of 1936 only 571 employees out of 3,000 were kept away from their jobs by illness.

Dr. Irving S. Cutter, dean of Northwestern University medical school and medical adviser of the Chicago *Tribune*, gives much of the credit for this excellent health record to air conditioning in the Tower.

Ten Most Important Sales Policies

W. H. Hodge, vice-president Public Utility Engineering & Service Corporation, speaking before utility company load builders gathered at General Electric's tenth annual Load Building Conference, outlined the ten policies most important in the sales departments of electric light and power companies today. These Mr. Hodge described as:

1. Developing young men and women and creating opportunities for them.
2. Developing the vertical instead of horizontal form of organization.
3. Running sales activities on a load-building but businesslike basis—profit and

RHYTHM

WHACK! And down the fairway flies the ball, straight and far—if he who swings the club has rhythm—that smooth co-ordination of mind and muscle.

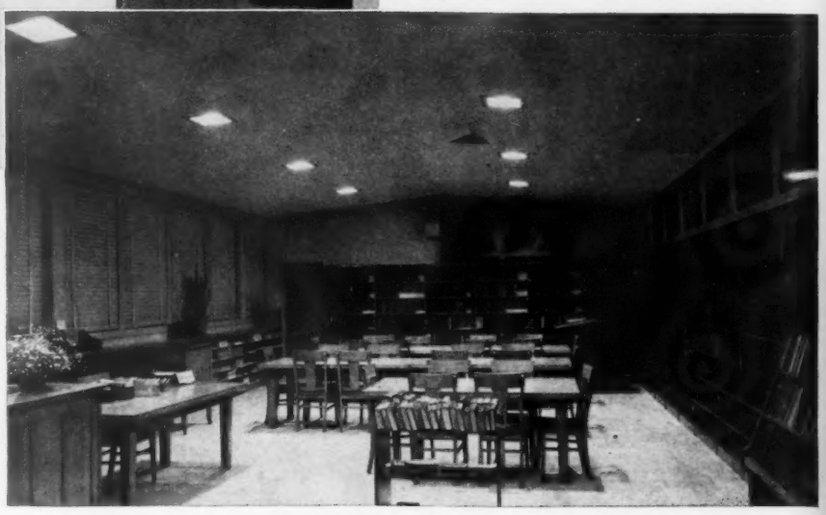
Around our place we have few, if any, of these rhythmic swingers. Still, there is a rhythmic rumble in our rolling mills, and in the purring growl of the bull-blocks—as miles and miles of Chromel wire are squeezed and drawn to size. Also there is smooth co-ordination from the top to the bottom of our pay-roll. Men, who've worked together for 15 to 30 years, come to understand each other, and their jobs, as well. . . . These things are told, not to glorify ourselves, but to try to convince you, that in our Chromel heating element wire, you may safely put your trust. If you sell or use electric heat, or make heating devices, Chromel will serve you well. . . . For technical data on Chromel, ask for Catalog-K. . . . Hoskins Manufacturing Company, Detroit, Michigan.

HOSKINS

CHROMEL

THE WIRE THAT MADE ELECTRIC HEAT POSSIBLE

Built-in Lighting for School



Lighting units flushed into the ceiling provide the high-intensity but glareless lighting recommended for exacting visual work at this classroom and library of the Long Beach Polytechnic High School, Long Beach, Calif. Units are mounted with reflectors in the ceiling and Holophane control lenses flush with the surface.

loss—as though the department belonged individually to the sales manager.

4. Developing independent thought and research as opposed to entire dependence upon manufacturers.

5. Assuring recognition of sales problems and conditions by chief executives and directors, and primary co-operation by all other departments.

6. Keeping national organizations and campaigns in their proper places—without sacrificing advertising unity, utilizing what is useful—rejecting everything else.

7. Maintaining an open mind for the consideration of promising new things and methods; a critical attitude toward fanciful schemes, theories and high-pressure concoctions.

8. Eliminating dry rot and bureaucratic tendencies by having periodical house cleanings.

9. Shaping all sales activities with full consideration for the problems and welfare of related industry groups—retailers, distributors, wholesalers, contractors and manufacturers.

10. Making every sales plan, activity and practice conform to the requirement that it must be to the beneficial interest of customers and the public in general.

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D.R. Plan Aids Sales and Public Relations

When the Blackstone Valley Gas & Electric Company, Pawtucket, R. I., replaced its crews of meter readers, collectors and salesmen with district representatives who performed all three functions, sales jumped and customer relations improved greatly. The new plan, as reported by *Sales Management*, now produces 90 per cent of company merchandise sales and is indirectly responsible for 70 per cent of all gas and electric appliance sales in the entire area.

The territory served by the company is highly industrialized, with 70 per cent of the homes those of mill workers, some of whom can neither speak nor understand the English language. Employment conditions are variable, since a family of five adults may find themselves unemployed, or they may bring in $70 or more each week.

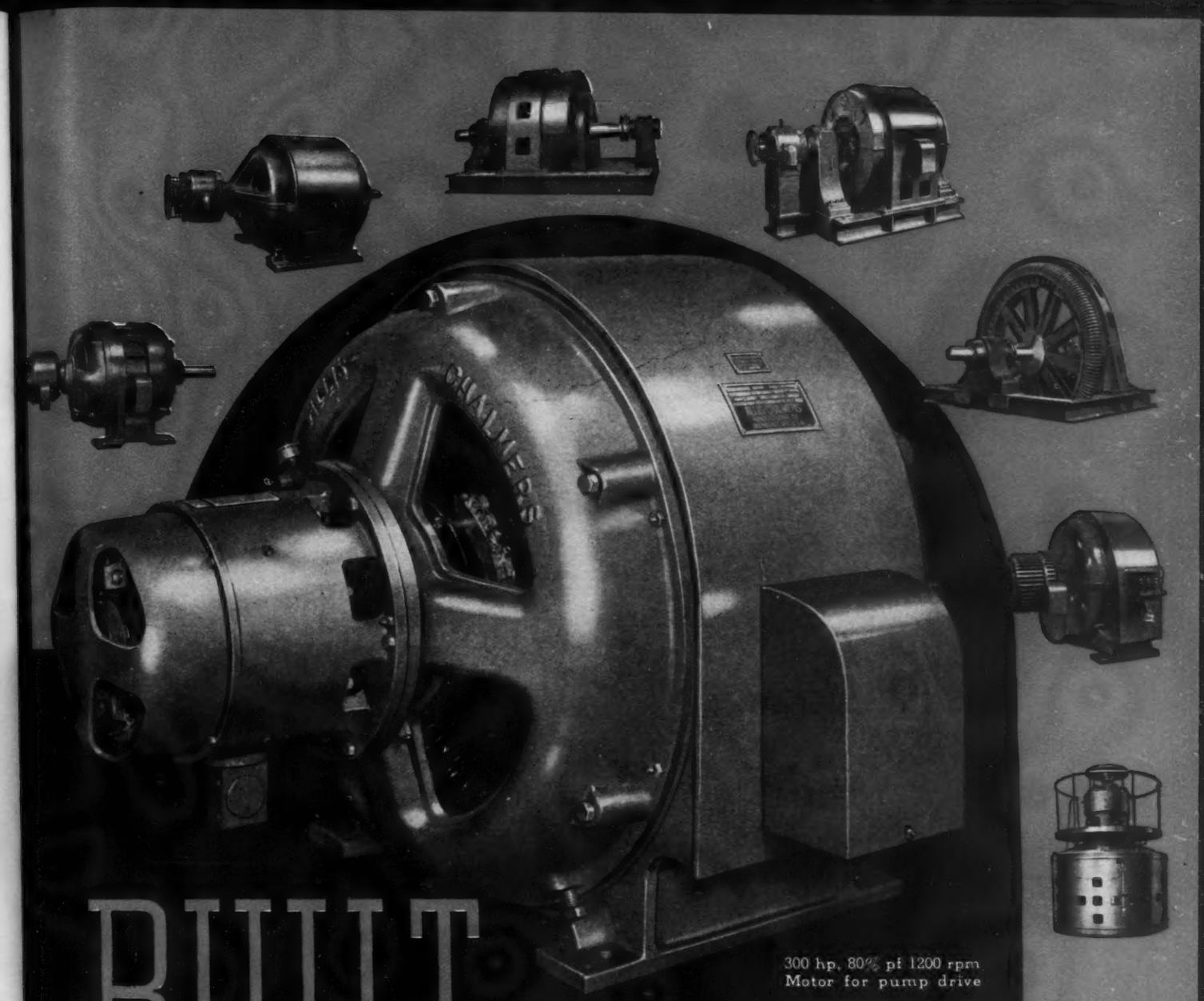
Under the new plan this territory is divided into 45 districts, each in charge of one man known as district representative. These men read meters, collect bills, make minor repairs to appliances in use in the home and sell the greater part of all appliances sold in the entire area. By reading only about 50 meters a day, they have time to cultivate the friendship of the housewife. Becoming familiar in this way with family circumstances, they naturally do not meet with as much resistance as the house-to-house salesmen and they gain direct tips—such as an approaching marriage, birth or wedding anniversary—for possible appliance sales.

Each man receives a flat salary for his routine work as well as a specified bonus for each sale. This bonus system applies to the sale of gas and electric automatic water heaters, ranges, refrigerators and ironers, the amount of the bonus depending on the size and type of unit and whether it is a new or replacement sale.

To arrive at these cash bonuses, each sale is given a point value, an automatic water heater sale having a credit of 22 points, a range 16 points, and a refrigerator either 13 or 7 points. If the quarterly total of these points exceeds the man's sales quota, he receives an extra 40 per cent of the total bonus earned, a strong incentive to go over sales quotas.

An unusual feature of these bonus plans is that the district men receive these same bonus and point credits even if the sale is made by a local dealer, since the company considers these men are indirectly responsible for all sales in the area whether or not they are company sales.

To obtain credit for sales the district representative must file a routine claim, giving all details of the sale and installation with verification by the dealer. Dealer sales are rechecked by the company with the dealer for accuracy of records. Bonuses are given only on actual sales.



300 hp, 80% pf 1200 rpm
Motor for pump drive

BUILT TO FIT YOUR JOB

Allis-Chalmers has long followed the policy of thoroughly investigating a proposed drive, before a synchronous motor is recommended, and then of designing a motor for that specific drive. For more than thirty years, we have pioneered the building of motors to fit specific drives and to meet specific problems. ★ That is why Allis-Chalmers synchronous motors are so universally satisfactory throughout industry. You cannot buy them "off the shelf". They are designed for your particular job. ★ The modern synchronous motor, as built by Allis-Chalmers, is the result of diligent research in design and construction, and may be obtained with torque characteristics suitable for practically any drive. ★ When an Allis-Chalmers synchronous motor is specified, it is built with correct starting, pull-in, and maximum torque, and with minimum starting kva consistent with the torque developed.

ELECTRICAL DIVISION

ALLIS·CHALMERS

MILWAUKEE WISCONSIN

New ENGINEERING IDEAS

Discoveries, proposals and developments by electrical engineers and scientists in the field, the factory and the laboratory

Device Measures Surface Reflection

A new photometric instrument for determining the light-reflecting efficiencies of flat surfaces and light transmission properties of transparent or translucent materials, known as the light cell reflectometer, employs two light-sensitive cells to measure the relative amounts of light received and redirected or transmitted by the sample under test.

Photometric device determines reflection and transmission factors of surfaces and materials

As shown, the device is being used as a transmitometer. With the lower sphere removed it may be used as a reflectometer.

The reflectometer, a 10-in. hollow sphere the inner surface of which is painted flat white, has two light-sensitive cells embedded in its equator facing each other. These cells are connected to a micro-ammeter atop the device. A movable tubular arm about 1 ft. in length is attached to the sphere. In the end of this tube is a projection lamp and reflector that directs a beam of light into the sphere so that it shines through a circular opening at the bottom of the sphere, where the sample is located.

To determine the reflection factor of a surface the opening in the sphere is placed over the sample. The projection lamp is adjusted by a rheostat until the micro-ammeter reads 100. Next the arm is adjusted so the beam of light falls on the sample at an angle of 30 deg. from the normal. Light reflected from the sample is picked up by the light-sensitive cells which register the reflection factor directly on the meter.

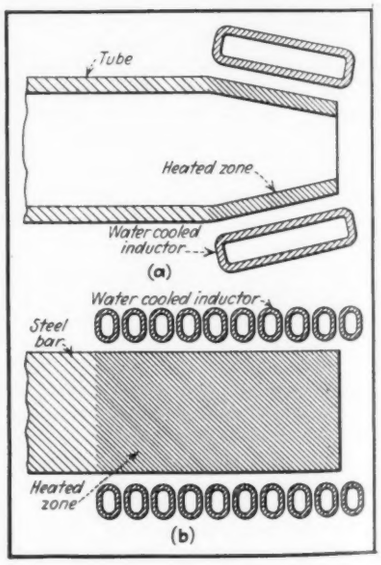
To measure transmission factors another sphere of similar size is required. This second sphere has a small opening at the top and incloses a silvered-bowl lamp mounted base down. The reflectometer sphere is placed on this second sphere so that the openings coincide. The lamp in the lower sphere is adjusted until the microammeter reads 100 on the scale. With the sample in place between the spheres all the light that enters the upper sphere and activates the cells must be transmitted through the sample. The micro-ammeter indicates what percentage this is of the light entering the upper sphere before the sample was inserted. This percentage is the transmission factor.

The light cell reflectometer is a development of the General Electric Company, Nela Park. It may be used to measure the reflection factors of all materials provided they have a flat surface and a circular area of 3-in. diameter.

Inductors Heat Tubes for Forging Operation

Induction heating of steel tube ends prior to a series of forging operations and the similar heating of an end section of large steel tubing prior to a swaging operation are made possible by two new applications of induction heating now being installed by Ajax Electrothermic Corporation.

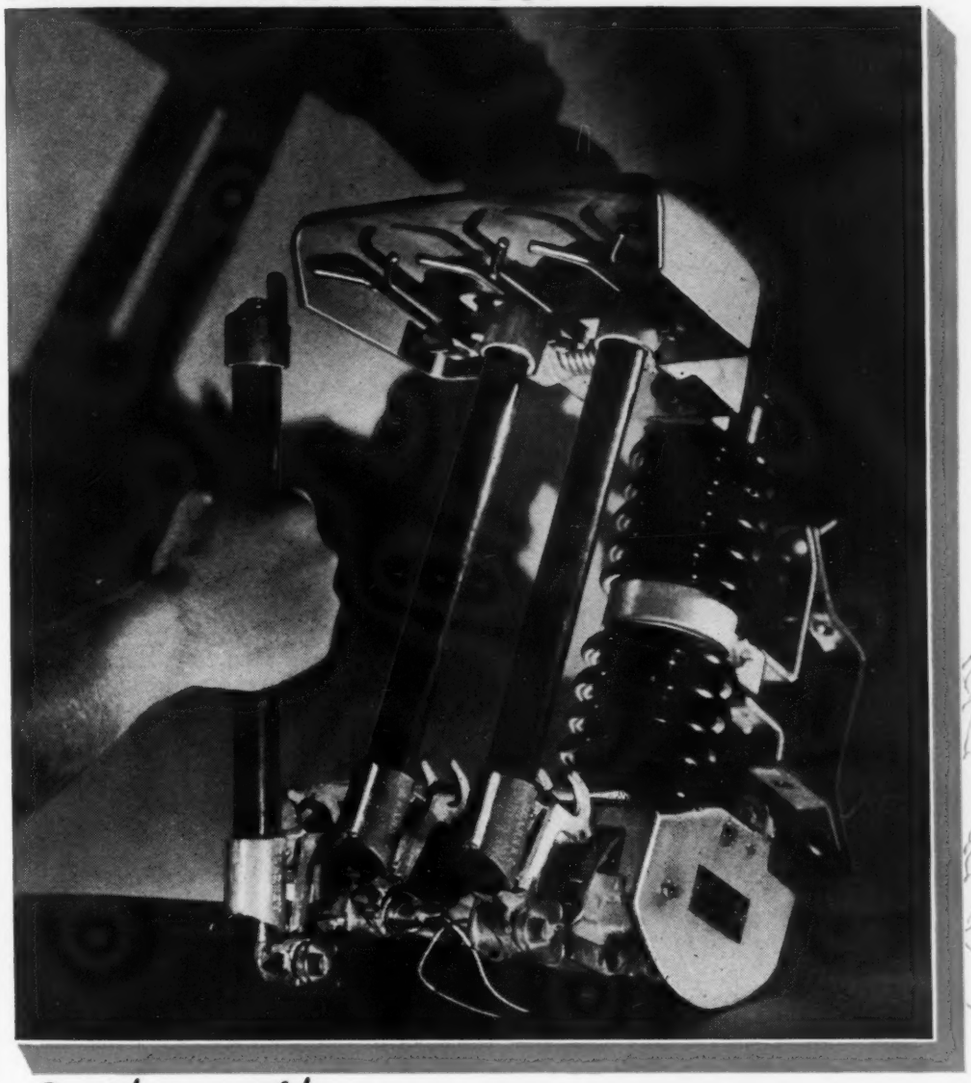
High-frequency current at 2,000 cycles is applied to special water-cooled inductors in the two types of heaters involved. In one type of heater the tubing is heated by insertion in a straight cylindrical coil which heats a



Sharply defined high-temperature zones obtained with high-frequency induction heater scheme

Current at 2,000 cycles in water-cooled special focus inductor (a) gives sharply defined heating zone in steel tubing. Straight coil (b) heats a 6-in. zone at the end of the tube.

It's a KEARNEY PRODUCT



YOUR QUESTIONS OUR ANSWERS

Q. Is it a fact that Kearney Trip-Savers can be re-fused and cartridges reset without regard to any set cycles of operation?

A. Yes, for example, if number one cartridge is in service and number three has already operated, number three may be removed and re-fused without disturbing either number one or number two, or in any way interrupting service.

Q. Do these Trip-Savers have positive Point Pressure Contacts?

A. Note in illustration how separate contacts are provided for each cartridge and how each contact gives constant pressure by means of a stainless steel spring at rear. The result—positive current transfer without excessive heating and direct contact with fuse link.

Q. Can the cartridge of a Kearney Trip-Saver be installed in reserve operating position without first cocking the actuating lever?

A. No. Unless the cocking lever is in proper position to throw the cartridge into service, the cartridge cannot possibly be installed . . . This assures proper operation of switch under all conditions of fusing.

Q. Are these Trip-Savers effecting worthwhile economies and reducing costly maintenance trips to outlying sections?

A. They must be—more Kearney Trip-Savers have been put into service by operating men during the past six months than during the entire year of 1936.

Why They are TRIP-SAVERS

Perhaps this operator's experience will suggest a worthwhile idea to you. He tells us this: "Serving six villages and fifteen towns in an area of about 600 square miles, many of our rural lines are subjected to high winds and lightning. After an outage, sectionalizing was done to a point where a 12 mile radial, 3 phase line runs south and serves a hamlet and railroad center and, at this point, disconnecting switches were removed and a Trip-Saver installed. This gave us an indication that trouble was in a section 12 miles north and thus saved us a patrol of the southern 12 miles. Indeed, that was 'trip-saving' and, of course, we saved time in locating trouble and speeded up restoration of service."

Write for Further Information on Trip-Savers.

Solderless Con-Nec-Tites; T-Con-Nec-Tites; Lap-Tite Connectors, Trip Out Fuse Switches; Trip-O-Link Fuse Switches; Trip-Saver Fuse Switches; One and Two Insulator Fuse and Disconnect Switches; Porcelain Housed Tripomatic Fuse Cutouts; Double Duty Fuse Cutouts; Pole Top Gang Operated Switches; Porcelain Housed Disconnect Switches; N.E.M.A. Hook Operated Disconnect Switches; Fuse Links; Fuse Link Boxes; Fuse Pullers; Secondary Fuses; Screw Anchors; Expansion Anchors; Full-Vu Guy Guards; Guy Wire Clips and Strand Bonds; Economy Cable Clamps; Dead-End Service Clamps; V-Groove Service Clamps; Hitemeters; "J" Hooks; Conduit Straps; ABC Sleeves and Machines; Cable Ring Saddles; Fit-Rite Wire Holders; Sleeve Twisters; Ground Wire Clips; Ground Clamp-Tites; Grounding Cable; Hi-Line Tools Accessories; Con-Nec-Tap Clamps; Grounding Sets; Masterenches.

JAMES R. KEARNEY CORPORATION
4236 CLAYTON AVENUE
ST. LOUIS, MO.

FACTORIES: ST. LOUIS, MO.—TORONTO, CANADA

JAMES R. KEARNEY CORPORATION ST. LOUIS, MO.

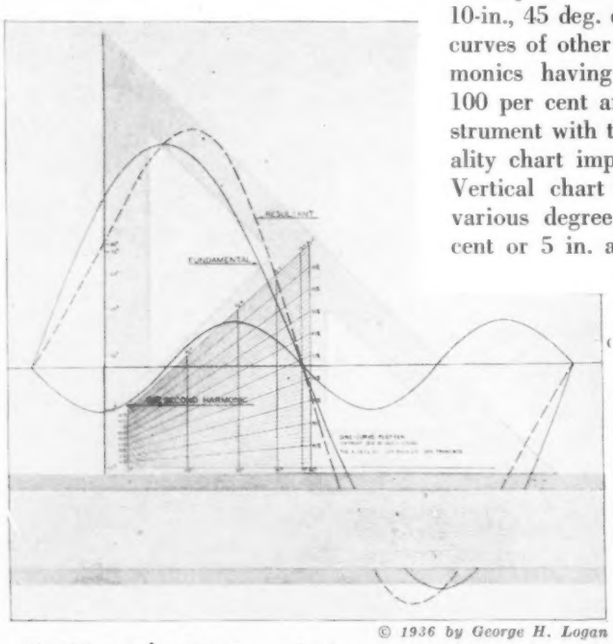
The Mark of Quality Products

6-in. length. The second type heater uses a special focus, single-turn inductor coil to heat a narrow and sharply defined band at the end of the tube.

The same fundamental type focus inductor coil involved in the design of the second type heater is used in the TOCCO process for hardening crankshaft bearings by the Ohio Crankshaft Company. The difference in these applications is that for surface hardening a large amount of power is concentrated for a short time, so that heating is confined to the surface of the crankshaft, which is then quenched to produce a very hard surface with a tough core. In the tube-end heating application the power is not kept at such a high value—the time is expanded to nearly a minute and the walls of the end of the tube are uniform in temperature at 2,200 deg. F.

Using the straight coil induction heater with high-frequency current it is possible to heat a 3-in. diameter billet to a temperature of 2,200 deg. F. in three minutes. Test indicate that a 7-in. square billet could be brought to a uniform temperature of 2,200 deg. F. throughout its section in fifteen minutes. To heat steel from room to forging temperature requires about 400 kw.-hr. per ton over all.

By altering the coil turns per inch or the location of the load in the coil it is possible to obtain a graduation in temperature in the heated section of the tubing ranging from, say, 2,000 deg. F. at the end of the tube to 1,800 deg. F. at the "cold" end. This is said to be an ideal condition for the forging operation.



© 1936 by George H. Logan

Combination triangle and sine curve plotter speeds drawing of sine curves of 5 in. amplitude and under

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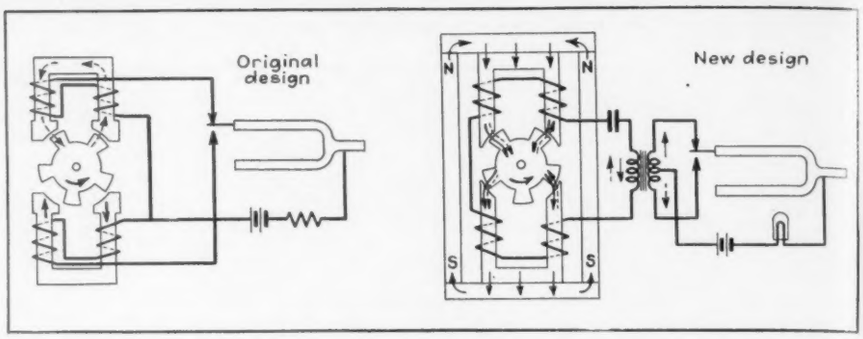
Sine Curve Plotter Speeds Drafting Work

By GEORGE H. LOGAN
Sound Department, Metro-Goldwyn-Mayer Studio, Culver City, Calif.

To make the job of drawing sine and cosine curves less arduous an instrument has been designed with which ordinates for curves of any amplitude up to 5 in. can be plotted quickly and accurately. This instrument plots points on these type curves directly, without need of any construction lines whatsoever. With its use the contour of a sine or cosine curve can be obtained in a matter of seconds.

In operation, degree ordinates for a 100 per cent (5 in.) amplitude sine curve are obtained from graduations die-impressed on the vertical edge of a 10-in., 45 deg. drafting triangle. Sine curves of other fundamentals and harmonics having amplitudes less than 100 per cent are plotted with this instrument with the aid of a proportionality chart impressed on the triangle. Vertical chart lines representing the various degree ordinates of 100 per cent or 5 in. amplitude curve are divided proportionately by means of diagonal lines. By placing the intersections of appropriate vertical and diagonal chart lines on the curve axis points on the curve can be dotted in at the significant edge graduation. The intersection used at each step represents the point on the cycle at that amplitude.



Superimposed permanent magnet field and semi-resonant circuit improve torque and stability of oscillograph timing motor

Improve Timing Motor for Oscillograph

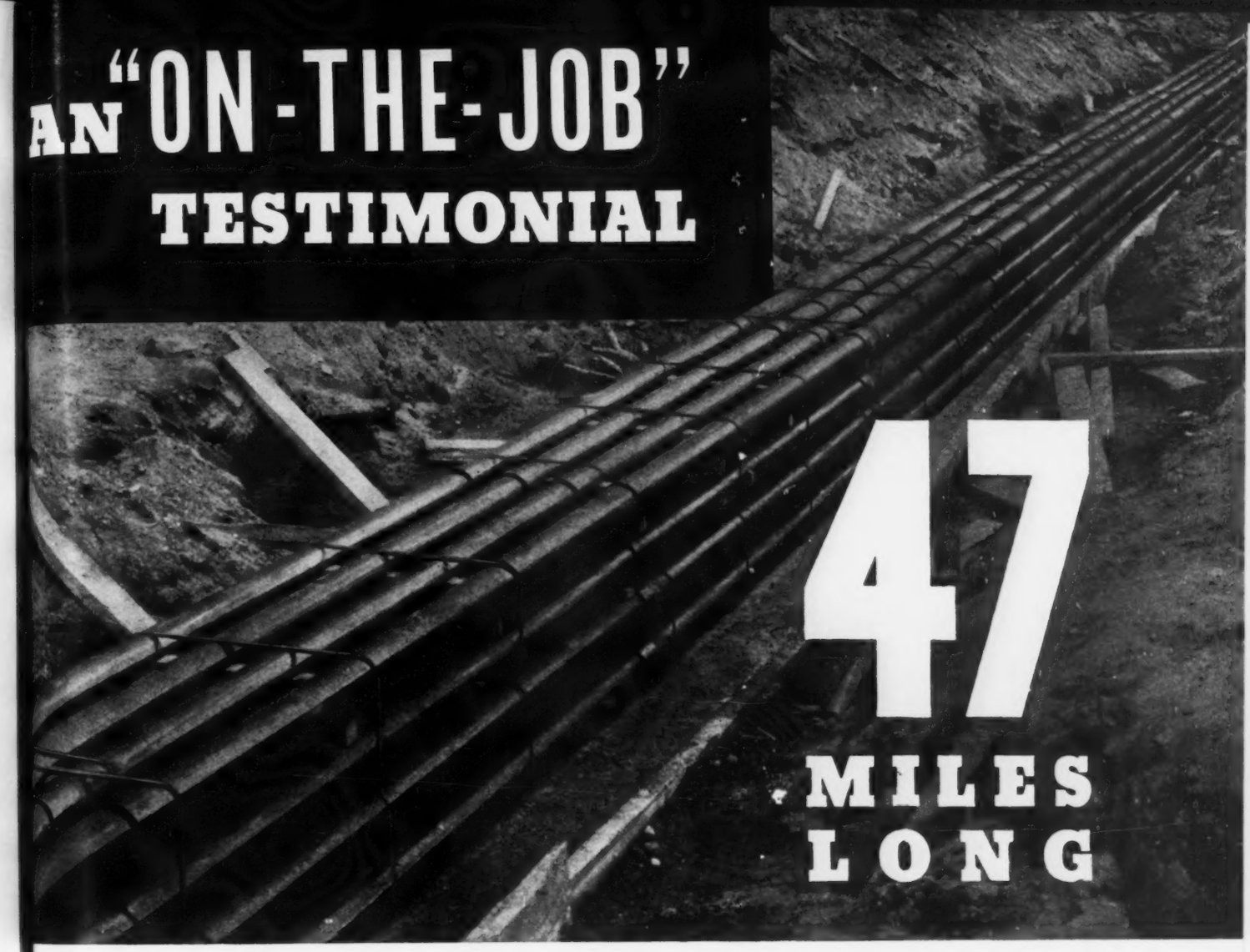
By superimposing a permanent magnet field on the reversing field of a synchronous impulse motor driving an oscillograph timing disk the pole flux was strengthened at critical points in the rotor's revolution, improving the motor's torque characteristics, reducing its tendency to hunt and improving the accuracy of the timing scale on the oscillogram, according to the *Bell Laboratories Record*.

In the original motor the four-pole windings were connected in two parallel circuits. Current from a battery source was reversed by the action of a controlling tuning fork. In the redesigned motor these windings were connected in series in a single circuit. A condenser having a capacitance slightly less than that required for resonance was connected in series with the motor windings and a transformer was employed to couple the rapidly reversing current of the battery to the motor circuit. This arrangement had a very beneficial damping effect that improved the stability of the motor.

Spacing and positioning of the poles in the new motor were changed so that two of the rotor poles are just approaching the two left-hand pole pieces (see diagram) when the net flux tends to build up in the left-hand magnets. By the time the next reversal approaches there will be two rotor poles just approaching the right-hand pole pieces.

Beside the major changes in the new design a tungsten lamp was substituted for the resistor formerly used in the battery circuit. This lamp has low resistance at ordinary temperatures, but with the high temperatures that occur with short circuit the resistance increases several fold.

AN "ON-THE-JOB" TESTIMONIAL



A PACIFIC COAST utility job called for 250,000 feet (over 47 miles) of fibre conduit. Specifications demanded Bermico Dura-Cell. Installation was completed far ahead of schedule. Two facts proved that Bermico Dura-Cell's new non-split coupling made speedy completion of this job possible:

1. Heavy driving, necessary for a tight joint, did not split even one of the more than 31,000 couplings used.
2. Not once did grout seep through joints and clog the duct.

Strong, virgin wood fibre gives Bermico Dura-Cell added toughness and resistance to impact—enables it to stand up under shocks, blows and rough handling. Watertight joints and rugged construction assure lasting cable protection. And Bermico Dura-Cell's lighter weight saves on trucking, handling and installation costs.

WHY THIS NEW COUPLING CAN'T SPLIT

Driving forces tapered conduit ends solidly against fillet in center of coupling. Pressure is held on direct line through fillet. Ends cannot wedge and press outward to split the coupling.

BERMICO DURA-CELL CONDUIT

A PRODUCT OF BROWN COMPANY, PORTLAND, MAINE

EXCLUSIVE DISTRIBUTORS

WESTINGHOUSE ELECTRI(SUPPLY COMPANY

BRANCHES IN EVERY LARGE CIT

News ABOUT PEOPLE

Westinghouse International Assigns New Duties to Knox

W. E. Knox has been appointed assistant general manager of the Westinghouse Electric International Company, New York. Mr. Knox joined

the Westinghouse organization in 1921. After taking the student course at East Pittsburgh, he entered the Westinghouse Electric International Company in 1922, where for a number of years he was engaged in sales-engineering work, specializing in power apparatus and in oil field equipment.

In 1932 Mr. Knox was made assistant to general manager, the position he held until his recent promotion. He will be responsible for the supervision of the Westinghouse International's foreign branch operations and headquarters departmental activities other than sales with headquarters in New York.

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► HARALD M. WESTERGAARD, who was named Gordon McKay professor of engineering at Harvard last fall, following twenty years on the engineering faculty of the University of Illinois, has been appointed dean of the Harvard Graduate School of Engineering. In this new position he succeeds Dean Harry E. Clifford, who became emeritus this year. Professor Westergaard has been a technical expert for the federal government on various construction projects.

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R. H. Luscombe Directs Sales for Penn Electric Switch

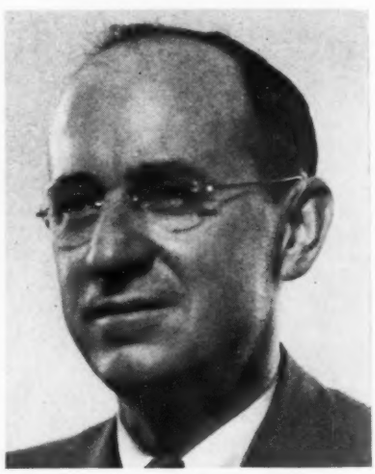
Robert H. Luscombe has been named sales manager of Penn Electric Switch Company, Des Moines, Ia. Mr. Luscombe has been connected with Penn Electric for three years, first in charge of sales to the gas heating industry and to accessories jobbers and distributors and more recently as manager of the company's New York branch office. Prior to joining Penn, he was in charge of industrial and space heating sales for the Des Moines Gas & Electric Company.

Mr. Luscombe will continue to direct activities of the company's New York branch until Penn Electric completes

the move to its new plant and office at Goshen, Indiana, at which time he will take over active sales management duties at the factory for both domestic and foreign sales.

E. B. Evleth Made Executive of Brown Instrument Co.

E. B. Evleth, affiliated with the Minneapolis-Honeywell Regulator Company for twelve years, has been appointed vice-president and general



manager of the Brown Instrument Company, a division of Minneapolis-Honeywell in Philadelphia. Mr. Evleth succeeds William J. Hajek, who has taken a six months leave of absence before resumption of active duties in an executive capacity with the Minneapolis office of Minneapolis-Honeywell.

C. L. Saunders, formerly regional sales manager at Chicago, has been appointed to succeed Mr. Evleth as resident vice-president in charge of the Midwest region for the Minneapolis-Honeywell Company. Charles C. Cochran, formerly of the Milwaukee office, has been transferred to Chicago to assist Mr. Saunders in all non-industrial sales activities throughout the entire Midwest region of Minneapolis-Honeywell.

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GEORGE W. BUTLER has been appointed manager of conduit sales for Steel & Tubes, Inc. Mr. Butler has been assistant midwest district sales manager of this Republic Steel Cor-

Translation:

Yuh kno' Fred, there's lots of ORANGEBURG in China too . . . all over the world it's giving cable protection, everlasting raceway facilities . . . and . . .

poration subsidiary in Chicago for the past four years. Prior to that time he spent three years in the company's Wichita and Kansas City offices. Mr. Butler was affiliated with the sales staff of the Economy Fuse & Manufacturing Company from 1923 to 1930. Henry R. Coward, who has been with the Kansas City sales staff of Steel & Tubes for the past four years, succeeds Mr. Butler as assistant midwest district sales manager in Chicago.

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Iowa Southern Utilities Board Elects New Officers

At a recent meeting of the board of directors of the Iowa Southern Utilities Company, Centerville, Edward L. Shutts was elected president and treasurer, H. W. Deininger was named vice-president in charge of operation and D. D. Bentzinger was elected general manager.

The election of Mr. Shutts culminates a period of service with the company which has extended over the past twenty years. Starting as assistant auditor in 1917, he became auditor and assistant secretary two years later and early this year his duties were enlarged to include that of assistant treasurer. During the past five years he was closely associated with the late E. F. Bulmahn in connection with the financial affairs of the company and, with the passing away of Mr. Bulmahn, Mr. Shutts was selected by the board to carry on the work which he had so ably assisted Mr. Bulmahn in doing.

Mr. Deininger has been general superintendent and chief engineer of the company for the past twenty years. Prior to becoming associated with Iowa Southern Utilities, he was with the Iowa Light, Heat & Power Company.

For the past eleven years Mr. Bentzinger has been assistant to the general manager of the company. Prior to his association with the company he was general superintendent of the Burlington Railway & Light Company of Burlington, Iowa, joining Iowa Southern Utilities in 1925.

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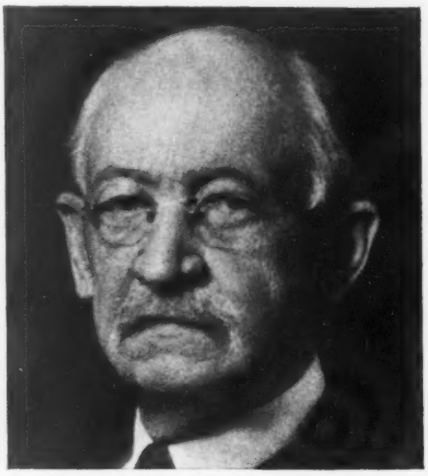
▶ H. N. HENRY, formerly district manager for the Alabama Power Company at Jasper, Ala., has been transferred to the new industries division. J. T. Jackson, formerly district manager at Sheffield, has been appointed to succeed Mr. Henry at Jasper.

Dean Turneaure Awarded Lamme Medal by S.P.E.E.

Dean Frederick E. Turneaure of the College of Engineering, University of Wisconsin, was awarded the Lamme Medal for outstanding accomplishment in the field of technical training at the 45th annual dinner of the Society for the Promotion of Engineering Education at Cambridge, Mass., on July 1.

The award commended the recipient in part for "his conception of a university as a co-operative enterprise of scholars and disciples in which freedom and power to initiate is diffused, not centralized; for the spirit of steadiness and confidence which he has engendered . . . for harmonious relations . . . and of the high place he has filled in engineering education and in public estimation not only in his commonwealth but in the nation as well." He has been dean since 1904.



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S. R. G. FINLEY of Columbus, Ohio, has been appointed chief engineer of the proposed municipal power plant in Chattanooga, Tenn. He has resigned his position as chief engineer of the rural electrification program in the Ohio Farm Bureau.

▶ T. A. PURTON, since 1920 in the engineering department of the Idaho Power Company, has resigned to join the staff of Ebasco Services Incorporated, as sponsor engineer with headquarters in New York. He is assigned engineering sponsorship of the Idaho Power Company and Utah Power & Light Company. In the course of his engineering career Mr. Purton has been identified with Allis-Chalmers, the Metropolitan Street Railway Company at Kansas City, Mo., the Union Pacific and the General Electric Company in Salt Lake City. He had just completed two terms as vice-chairman of the engineering and operating section of the Northwest Electric Light & Power Association, and was to have been appointed chairman in July. He is now a member of the transmission and distribution committee of the Edison Electric Institute.

▶ JOHN J. O'CONNELL, manager of the Pittsfield Electric Company and director of public relations for the Western Massachusetts Companies and their constituents, has been elected president of the Pittsfield Chamber of Commerce.

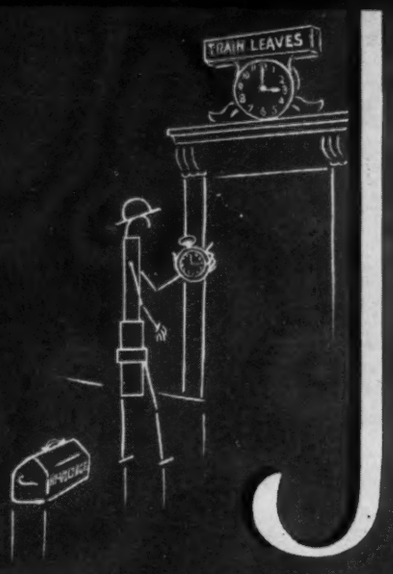
▶ E. R. BEDENBAUGH has been appointed manager of the Hartwell district of the Georgia Power Company to succeed P. C. Lynch, who is on leave of absence due to illness. Mr. Bedenbaugh has been connected with Georgia Power since 1933.

OBITUARY

Charles L. Cadle

Charles L. Cadle, president of the New York State Electric & Gas Corporation, died in Binghamton, N. Y., July 4, after a long illness. He was 58 years old. Mr. Cadle had been prominently identified with the utility industry in New York for many years.

A native of Mentor, Ohio, and a graduate of the Case School of Applied Science in Cleveland, he spent the early years of his career in the railway field, first in Cleveland and then with the New York State Railways. In 1921 he was appointed by Governor Miller State Superintendent of Public Works and served in that capacity for two years. In 1923 he became consulting engineer for the Rochester Gas & Electric Corporation and one year later was made general manager of that property and subsequently vice-president and general manager. In 1930 Mr. Cadle was appointed general manager of all the Associated Gas & Electric Company properties in the state of New York. He continued his duties with the Rochester utility, but moved to New York City. Three years later he became vice-president of the Utility Management Corporation and was elected a director of the New York State Electric & Gas Corporation. It was in 1935 that he assumed the duties of president.



JUST RIGHT!

NOT TOO FAST

To permit the breaker on the secondary to function.

NOT TOO SLOW

To prevent line outage due to primary fault. Clears 20,000 ampere short in ½ cycle.

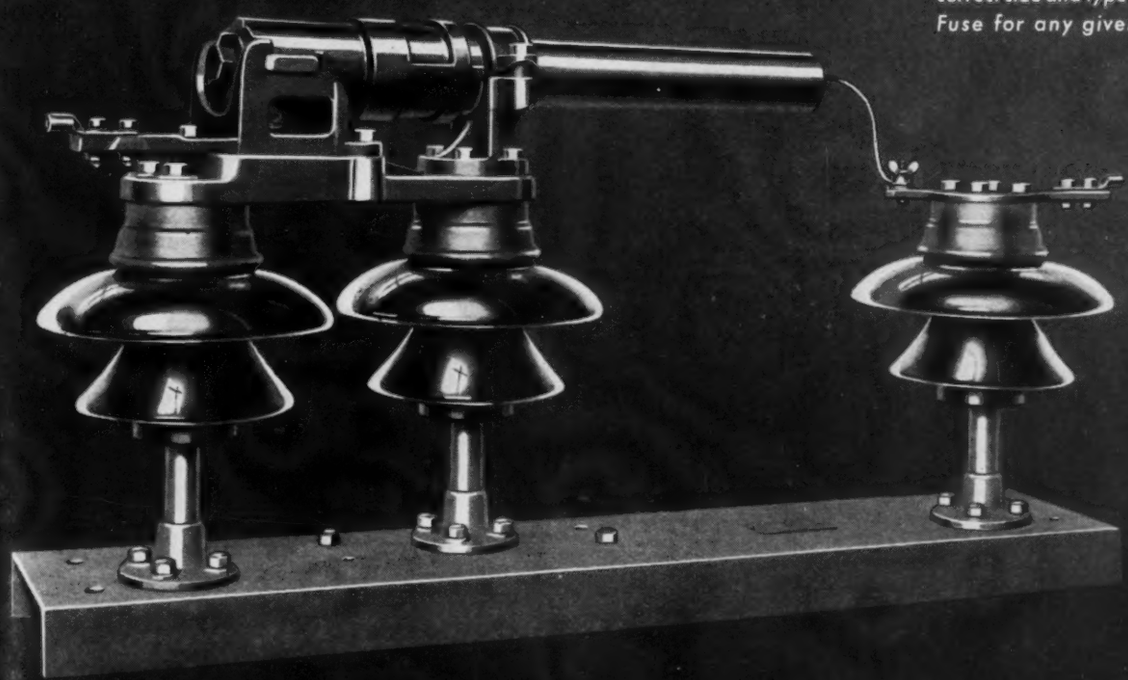
ABSOLUTELY RELIABLE

HI-VOLTAGE Fuses have proved their reliability in both extensive tests and wide service. The burning of the fuse link creates a high pressure within the tube, thereby expelling the gases and any unconsumed portion of the link, at a high velocity. *The arc is cleared within the fuse tube;* the air gap serving chiefly to prevent any leakage of current through or over the fuse tube after the fuse has blown. The tubes are so proportioned that high pressure and velocity are developed on light loads, thereby *clearing any load that will melt the fuse wire.*

HI-VOLTAGE FUSES

Establish an air gap in the line simultaneous with the blowing of the link.

BULLETIN NO. 24 gives all of the information required to select the correct size and type of HI-VOLTAGE Fuse for any given requirement.



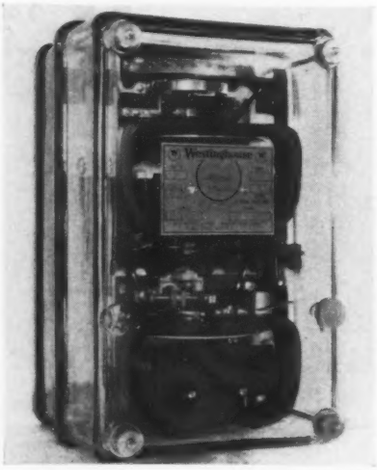
HI-VOLTAGE EQUIPMENT CO.

2891 EAST 79TH ST., CLEVELAND, OHIO

New EQUIPMENT AVAILABLE

Ground Relay

A new relay which permits directional relaying of ground faults by use of only two potential transformers, connected in open delta, is intended for use in place of



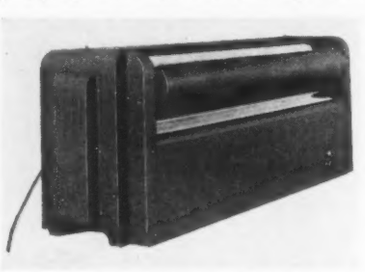
Type CRS directional overcurrent negative phase sequence relay. **Westinghouse Electric & Mfg. Co.**, East Pittsburgh.

the conventional ground relay when the required residual potential or current source is not available for polarizing the directional element. It consists of an induction overcurrent element and an induction type directional element. Overcurrent element has tap range of 4 to 15 amp. and operates from zero sequence current. Directional element operates from negative phase sequence voltage and current derived from filters, instead of from zero sequence quantities as in the conventional ground relay. It will operate on 4 amp., one volt in phase.

•

Black-and-White Printer

This continuous printer, designed for exposing "BW" black-line paper or blue-print paper, plugs into any convenient light socket.



Model 3BW, built for 100 volts a.c. and 110 volts d.c.; exposes papers up to 42 in. wide. **Charles Bruning Co., Inc.**, New York.

With it, according to the makers, a single operator, using average tracings on cloth, can easily print and develop two to three 50-yard rolls of black-line paper every day. It may be used with the company's black-and-white developing machine to produce black-line prints from tracings or drawings; paper is exposed in the printer and developed instantaneously in the developing machine.

•

Photo-Electric Counters

Three units make up new photo-electric counting equipment, said to be the first of its kind. Light from a 6-8 volt, 32-cp. automobile headlamp falls on a photo-electric cell in an amplifying and rectifying unit, which in turn actuates a four- or five-digit counter, remotely located. No relays or magnetic switches are used in the amplifying unit. Counter is said to be accurate up to 240 counts per minute, with a special type capable of operating up to 100 counts per second.

Type 257 light source, right; Type 67 photo-electric amplifier, left; four-digit counter, top; for operation on 110-115 volts, 50 or 60 cycles. **Electronic Control Corp.**, Detroit.

•

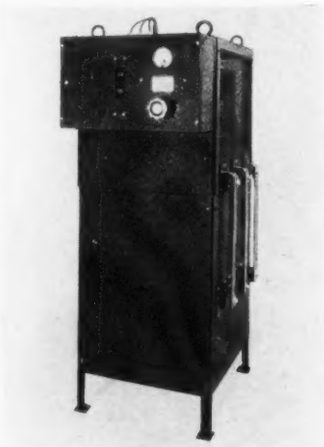
Long-Tube Mercury Lamps

Horizontal Cooper-Hewitt lamps; 33 and 50 in. sizes; over-all efficiency about 15 lumens per watt. **General Electric Vapor Lamp Co.**, Hoboken, N. J.

This company has recently modernized its line of Cooper-Hewitt mercury lamps; the 50-in. size, operating at 350 watts, a.c., is said to supply the same light output as the older 450-watt type; the 33-in. size operates at 280 watts instead of 350 watts as previously. Both reflector and tube are intended for mounting horizontally. A new vacuum type interrupting switch replaces the older "shifter" to provide instant starting. Regulating circuit is equipped with special Pyranol transformers; new power factors are 90 per cent and 85 per cent, respectively, for the 50- and 33-in. sizes.

Electroplating Rectifiers

Copper oxide plate type rectifiers offered for electroplating service use rectifier units especially developed for high amperage. The self-contained unit comprises three main



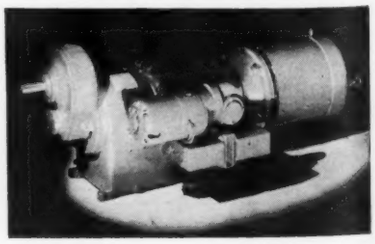
Copper oxide plate type rectifiers. **Hanson-Van Winkle-Munning Co.**, Matawan, N. J.

parts—a single, two or three phase power transformer for changing the available a.c. supply to a suitably low voltage, small vertical fan to provide circulation through the unit, and the rectifier unit proper, consisting of a large number of rectangular copper plates oxidized on only one side and assembled in racks, with proper spring pressure applied to both surfaces. Voltage selector taps permit three major voltage adjustments, with the vernier control switch providing finer adjustments. A "De-ion" circuit breaker and switch is also used.

•

Variable-Speed Transmission

This variable-speed transmission, used to drive a printing press, is equipped with a 7½-hp., 1,140-r.p.m., three-phase, 60-cycle, 440-volt, flanged type electric motor, the



Type DEC, 88 transmission; normal output rating, 8.5 hp., peak, 12.3 hp., when operated at 1,090 r.p.m.; starting torque 680 in.-lb., normal torque 490 in.-lb., peak torque 732 in.-lb. **The Oilgear Co.**, Milwaukee.

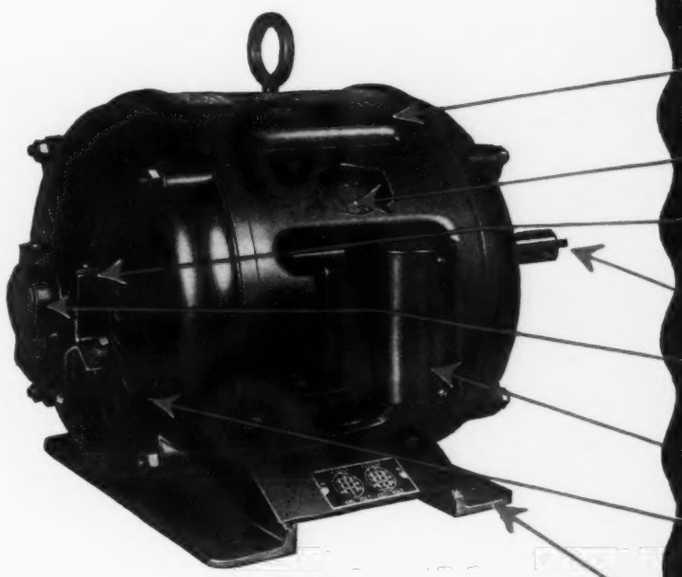
YOU WILL BE BETTER SATISFIED

WAGNER has furnished motors for industrial equipment for many years and has continuously improved motors for this purpose. Among the outstanding features of Wagner motors are: (1) QUIET OPERATION, (2) special operating characteristics to meet this exacting service, (3) long life, and (4) attractive appearance.

THEY MEET YOUR REQUIREMENTS OF PERFORMANCE AND DEPENDABILITY

WHEN YOU INSTALL

Wagner POLYPHASE MOTORS



A FEW OF THE POINTS OF SUPERIORITY OF WAGNER SQUIRREL-CAGE MOTORS ARE:

FRAME is fabricated from heavy steel-plate rolled into cylindrical shape and welded.

AIR-OUTLETS are extra large for unrestricted ventilation.

OIL-WELL HOUSINGS are sealed against the entrance of dirt and grit, and the escape of oil.

SHAFT is designed to carry mechanical overloads.

BEARING is steel-backed, babbitt-lined. Wagner also furnishes ball or roller bearings.

CONDUIT-BOX is mountable in four positions.

END-PLATES are liberally designed, heavy and massive, amply strong and rigid, to withstand severe service conditions.

FEET are of steel, welded to the stator-frame—accurately spaced according to Wagner dimensional diagram sheets.

Many other features of Wagner motors are worth investigating. Write today for Bulletin 182

The Wagner line includes all types of motors generally applied on industrial equipment, making it possible for you to completely equip your plant with Wagner motors. Whether alternating or direct current; single or polyphase; open, drip-proof, or totally-enclosed; rigid or resilient-mounted—there's a Wagner motor now in existence, ready to be applied on the job.

Wagner Electric Corporation
6400 Plymouth Avenue, Saint Louis, U.S.A.

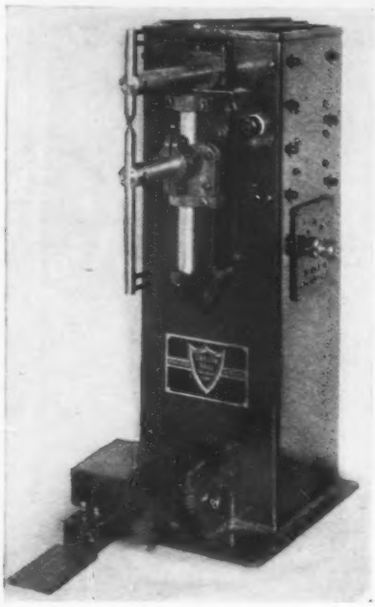
MOTORS · TRANSFORMERS · FANS · BRAKES

drive shaft of which is splined to drive the coupling in the transmission. The output end is equipped with a straight type gear reducer which reduces the maximum output speed from 1,090 to 300 r.p.m. A control motor connected to the stroke-adjusting screw on the transmission permits remote control of the output speed from two five-button push-button stations.

•

Spot Welders

The upper electrode of this small spot welder moves in a vertical plane instead of in the arc of a circle. Thus, says the manufacturer, accurate and easy alignment of the electrodes is provided and two welds up to the machine's capacity may be made simultaneously. Transformer and upper horn assembly replace the more customary spring as pressure unit; pressure is adjustable from 25 to 250 lb.



Offered in 10, 17, and 25 kva. sizes; for use on 220, 440 or 550 volts. Horn lengths from 8 to 18 in.; five-point heat regulator. **Taylor-Hall Welding Corp., Worcester, Mass.**

Pull-Out Service Switch

Design provides more compact and efficient device, with unit block on sub-base, removable for wiring by loosening one screw. Centralized assembly in cabinet enables main entrance switch to be located at top or reversed to locate main and range circuits at cabinet bottom. Additional wiring space is available between rear wall of cabinet and unit block, permitting all wires to be pulled in and shaped up without the block in place. Pull-out fuse holders have heavy wire handle and post-type solderless connectors to speed up installation. One screw is provided to keep main cover closed, assuring use of the auxiliary cover for fuse replacement, giving safety "dead front" advantages.

New 7RL4 Noark unit, providing in one assembly a main switch, range switch, four circuits of lighting and a 35 or 60-amp. tap for water heater or bus extension. **Colt's Patent Fire Arms Mfg. Co.,** Hartford, Conn.

•

Temperature Controls

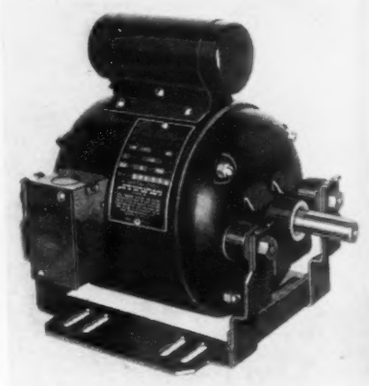
This company has recently announced a sensitive type temperature control which, in spite of its sensitivity, is said to be built along the same rugged lines as its other temperature instruments for industrial use. It is suitable for use in air or in liquids, for temperatures up to 150 deg. C. with an adjustable range of approximately 75 deg. C., depending on the length of tube exposed to the changing temperature. In air, an operating differential of from 1/5 to 1/10 deg. C. may be expected from instruments having tubes of standard length, 21¾ in., it is claimed.

Model HS-4; standard instruments operate on 110 volts, a.c. Special relays with 20-24-volt control circuits can be furnished. **Burling Instrument Co.,** Newark, N. J.

•

Blower Drive Motor

Two-speed, capacitor start, induction run motors are designed to provide speed control for belted-drive furnace blowers. Speed changes are obtained through a three-point switch or furnace bonnet control.



Ratings, 1/6, ¼, ⅓ and ½ hp.; high speed, 1,750 r.p.m.; low speed, either 1,150 or 850 r.p.m. **The Peerless Electric Co.,** Warren, Ohio.

•

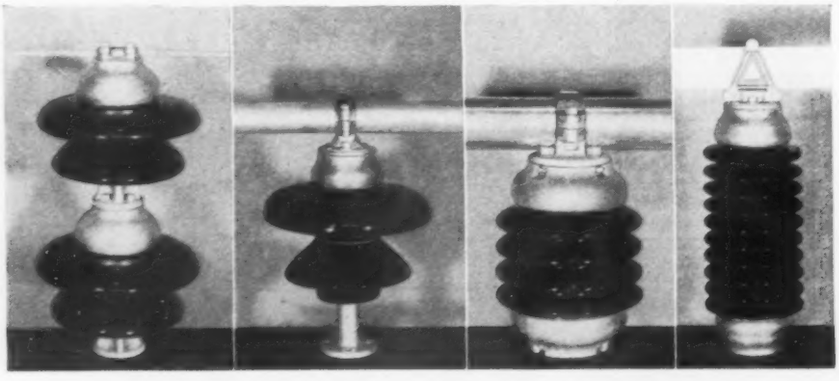
"Magnetic Micrometer"

Instrument has 100 divisions, each corresponding to approximately 0.00001 in. of nickel; weight, 7½ lb. **American Instrument Co.,** Silver Spring, Md.

The local thickness of an electroplated nickel coating on a non-magnetic base metal may be measured by this new instrument. Method involves the measurement of the force required to detach one pole of a permanent magnet from the nickel coating, and the comparison of this force with that required to detach the same magnet from a similar coating of known thickness. For thin coatings, this method is said to approach the accuracy of metallographic measurements, without the destruction of the specimen.

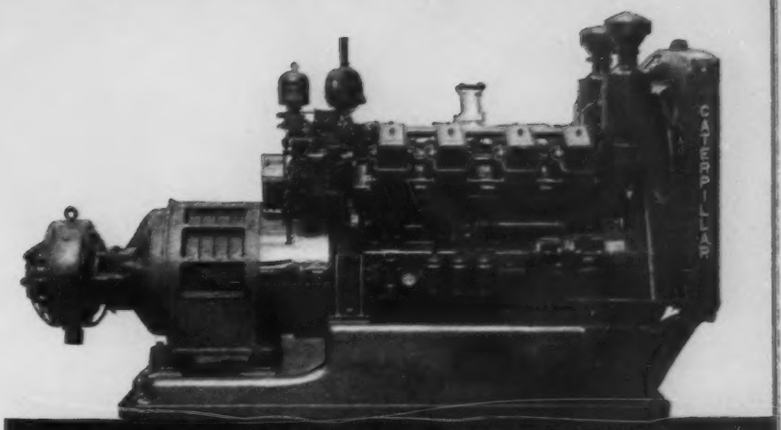
Outdoor Bus Support Clamps

This company has recently announced a complete line of outdoor bus support clamps. Included in the line are adjustable clamps for pipe buses and for vertically mounted bar buses; non-adjustable clamps for pipe buses, stranded conductor buses and horizontally mounted flat bars. Bronze and hot-dip galvanized malleable iron are used, with clamps of bronze throughout available for use with heavy currents. Cap-and-pin mountings are furnished, the cap style being used with station post insulators.

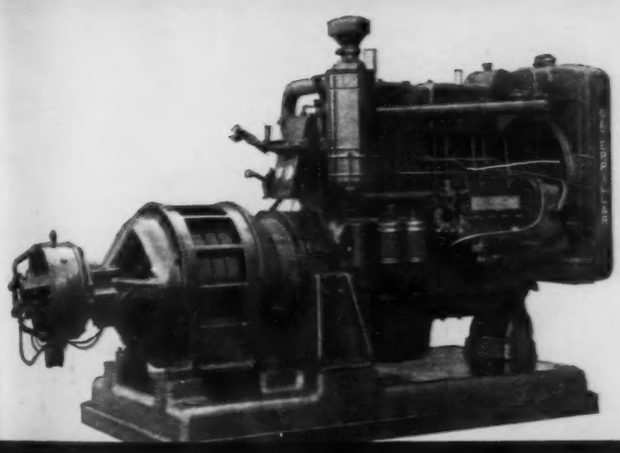


Left to right: standard 69-kv. support with clamp for stranded cable bus; 34.5-kv. support with adjustable clamp for tubular bus; special 7,000-lb. cantilever strength support for heavy-duty bus; station post insulator with adjustable clamp for flat bars. **Lapp Insulator Co., Inc.,** LeRoy, N. Y.

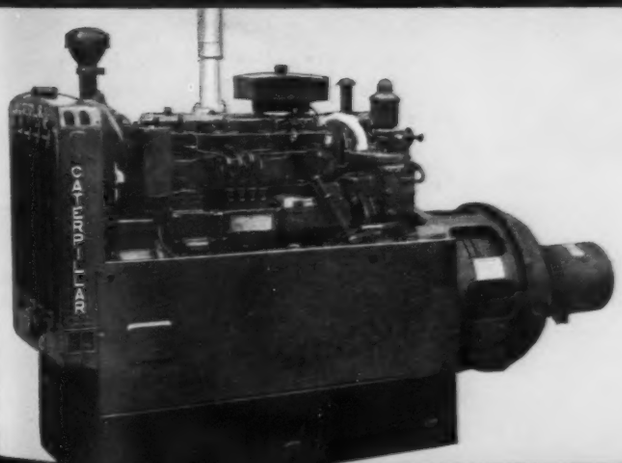
FOR BUSINESS "IN ESCROW"



THE 80-KW. SET WITH D17000 ENGINE



THE 40-KW. SET WITH D8800 ENGINE



THE 20-KW. SET WITH D4400 ENGINE

JUST beyond its present service area every utility sees new communities "on the way up"—though, perhaps, not yet sufficiently congested to warrant power-line extension. While this potential business is gathering size is the time for the utility to gain a foothold—by providing current through individual Diesel-powered generator sets temporarily installed in the community. It is surprising how little business is necessary to make such installations not only self-supporting but profit-yielding. Consuming low-cost fuel, and using it sparingly, "Caterpillar" Diesels furnish power for less than a cent per kwh. As each community outgrows its "swaddling clothes" and the power-line comes in, the generator sets can be moved on to the next development of business "in escrow." Talk it over with our nearest dealer—or, write us direct.

7 ENGINE-GENERATOR SIZES

A.C. OR D.C., IN A CHOICE OF VOLTAGES

D17000 . . . 80 KW.	D8800 . . . 40 KW.
D13000 . . . 60 KW.	D7700 . . . 35 KW.
D11000 . . . 50 KW.	D6600 . . . 30 KW.
	D4400 . . . 20 KW.

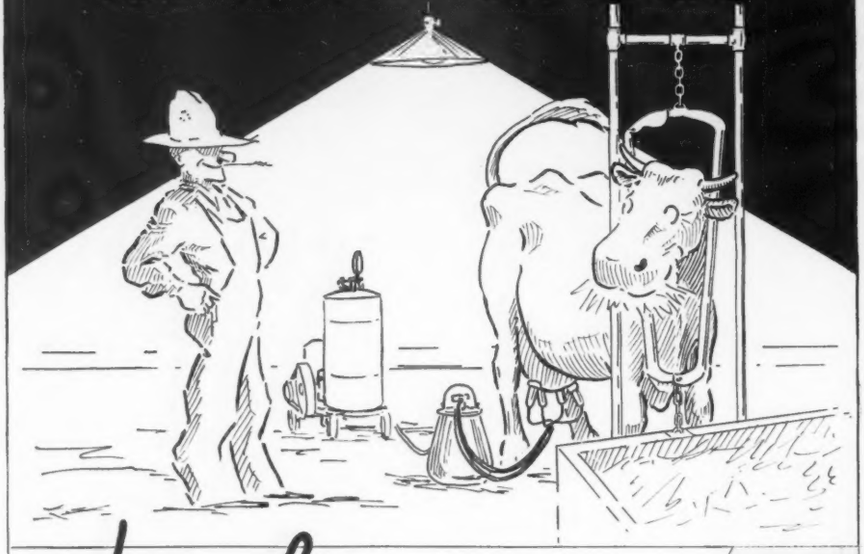
CATERPILLAR DIESEL ENGINES

REG. U.S. PAT. OFF.

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

WORLD'S LARGEST MANUFACTURER OF DIESEL ENGINES

KEEP THE COWS CONTENTED
AND THE FARM LOAD PAYING



Build DEPENDABLE
ECONOMICAL RURAL LINES

USE THESE CHANCE ANCHORS and FIXTURES

1. Wej-Lock Expanding Anchors in 2, 3, and 4 way
2. Straight Thimbleyes useable with machine bolts
3. Angle Thimbleye Bolts for down guys
4. Angle Thimbleyes for down guys
5. No-Wrench Screw Anchors 4" to 10"
6. Angle Guy Clamp eliminates extra fixtures
7. Chance Steel 4-way Expanding Anchor
8. Straight Thimbleye Bolt
9. Chance Cone Anchors for economy and service
10. The New Chance Rock Anchor —no grouting
11. Chance 2-Way Steel Expanding Anchors
12. Thimbleye Anchor Rods
13. Thimbleye Nuts

All Chance Expanding, Never-Creep, and Cone Anchors have the Chance Patented Nut Retainer or Nut Housing.

A·B·CHANCE CO.
Utilities Division
CENTRALIA MISSOURI

Engineers Need Mouthpiece on Public Questions

[*Continued from page 48*]

vast untamed domain which built this country, and gave it the highest standard of living in the world. The geographical frontiers have disappeared, but the frontiers of science and technology still remain. Those qualities which built a trail into the wilderness can still build trails in the technological advance. The same qualities of courage, resourcefulness, independence which opened the nation are as necessary today as ever.

The free operation of professional classes, motivated by public zeal and altruism, is an anchor upon which our democracy depends to hold it through the storm. There is a great obligation upon the professional man, to speak clearly, to insist upon being heard, to maintain his independence. This obligation rests heavily upon engineers.

To be a professional engineer in the true sense does not require that we have some special set of relationships to society and to the organizations of which it is made up. It does require that the primary motivation be the acquisition of scholarship and its generous application to the needs of man.

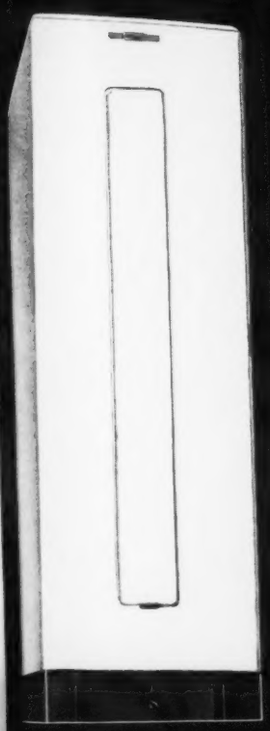
To be an engineer in these days is to bear a proud title. To be able and willing to speak true opinions on the complex technical affairs of the day, without prejudice and free from control, is a privilege that is becoming rare in the world. Insistent upon his prerogatives, kowtowing to no man, respected because he speaks a truth the country needs to know, the independent engineer stands as an important member of the professional class, a strong bulwark against disaster, which can guide our steps into the ways of pleasantness and into the paths of peace.

•

Plant Addition Planned

United States Electrical Motors, Inc., East Slauson Avenue, Los Angeles, Calif., manufacturer of motors, parts and allied equipment, has plans under way for one-story addition to plant, sawtooth roof type, totaling about 12,000 sq. ft. of floor space. It is estimated to cost close to $60,000, with equipment. Work on the superstructure is scheduled to begin soon. Grant & Bruner, Ferguson Building, Los Angeles, are architects and engineers.

Join the march



to NEW LOAD BUILDING PROFITS with Hotpoint ELECTRIC WATER HEATING

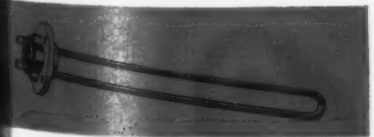
THE VOGUE—*Hotpoint's square-type Electric Water Heater is a real style leader*

HOTPOINT HELPS UTILITIES BUILD LOAD.. INCREASE REVENUE

Progressive utility companies everywhere are on the march to new load-building profits from Hotpoint electric water heating. Now is the time to fall into step and garner the rich extra revenue that comes with active promotion of this modern electrical service.

Follow the lead of Hotpoint. Discover the natural sales advantages incorporated in the smart modern styling and sturdy construction of the Hotpoint Vogue and Master models. Learn why more electric water heaters were sold in 1936 than in the previous four years combined.

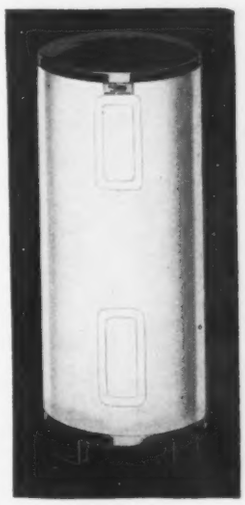
From the beginning, Hotpoint electric water heaters have been developed and designed with utility problems in mind. Whatever your demands may be, whether for off-peak or continuous service, Hotpoint has a model to fill your needs. Capacities range from 1 to 140 gallons—the most complete line in the industry. Hotpoint engineers will be pleased to work out with you the most effective solution to your water heating problem. Write today, or see your nearest Hotpoint representative.



Hotpoint's famous Calrod heating unit is immersed directly in the water within the storage tank—delivers heat directly into the water.

5 REASONS FOR HOTPOINT LEADERSHIP

1. Large scale manufacturing permits volume production.
2. Prices reduced due to modern equipment and manufacturing methods.
3. Foremost design in harmony with modern styling.
4. Vast improvements aid efficiency of operation.
5. Calrod, Hotpoint's sealed unit, delivers heat directly into the water.



THE MASTER—*Hotpoint's popular round-type automatic water heater*

EDISON GENERAL ELECTRIC APPLIANCE CO., Inc.
5618 W. Taylor Street, Chicago, Illinois

Hotpoint

AUTOMATIC ELECTRIC WATER HEATERS

Use DILECTO

when you need an insulating material to withstand moisture

Even when directly exposed to moisture or high humidity Dilecto, a laminated phenolic plastic material, retains its insulating properties and its mechanical accuracy. It is an ideal material for parts which must be electrically and mechanically stable.

Let us tell you more about Dilecto, how it is manufactured, about various grades in both paper and fabric, developed for specific electrical requirements. You'll find complete data in the Dilecto catalog. Write for your copy today.

CONTINENTAL-DIAMOND FIBRE COMPANY

NEWARK, DELAWARE

Represented in Canada by

DIAMOND STATE FIBRE CO. OF CANADA, LTD., TORONTO

Socket Meters Tested on Customer's Premises

[*Continued from page 49*]

Upon receiving customer's permission, tester then proceeds to remove the meter from the side of the house and installs jumpers to by-pass load, takes the meter and his test equipment into the customer's home and by means of a fairly long extension cord plugs his equipment into the nearest convenience outlet at any point in the house which the customer suggests. Test equipment may be set on a table or a chair at some convenient height. Meter is plugged into the test panel and work is proceeded with. If the customer so desires, he may observe tester at work and at this time may receive answers to any questions he might have regarding the meter's accuracy, frequency of testing, reliability, etc.

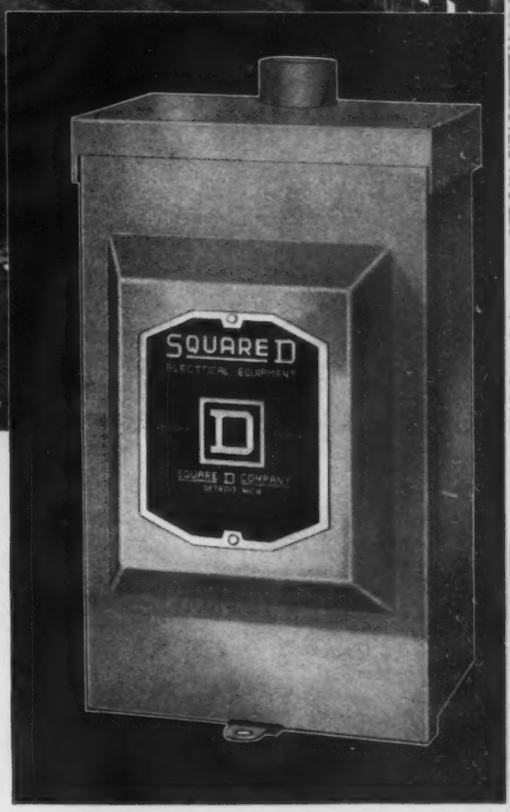
Suggests wide usage

This visit with the customer also enables the tester to apply his technique in the matter of the further use of electricity and load building. Upon completing the test of the meter (it should not take very long) tester returns the meter to its original location on the outside of the house and goes on to the next customer. Should the tester arrive at some location where there is no one at home he could still test the meter either by taking it to the next customer's home or, by attaching his equipment in the meter socket, and with the extension long enough to reach, may do the work on a porch or any sheltered spot on the premises.

Advantages of on-premise testing of socket meters

1. Minimum of expense, since only one man will be necessary to do the work.
2. Public relations are maintained and established through this contact with the customer.
3. Confidence in the accuracy of the meter is established.
4. Meters may be tested the year around, regardless of weather conditions.
5. Meters are tested in favorable locations which will be more conducive to accuracy than the present testing of house meters, which is many times done in coal-bins, attics and in precarious positions.
6. More meters per day may be tested than is possible now with the indoor meters.
7. Training and knowledge required of meter tester will be at a minimum, since the test panel is so arranged that no changes of wiring are necessary for testing either two- or three-wire meters and each operation will be more or less mechanical and simple.
8. By means of an adapter plate the same equipment may be used to test indoor type house meters or "A" type outdoor meters.

Rural Customers of Power and Light Companies Can't Buy Fuses as Easily as Their City Cousins..



RAINTIGHT MULTI-BREAKER for Outdoor Service

They need the

SQUARE D MULTI-BREAKER

● A blown fuse in the city is an inconvenience. On the farm, it is a near tragedy. At best, it means a trip to a neighbor, a long journey to town, a costly service trip for the power company—and rural service calls are excessively expensive. Recommend to your rural customers the Square D Multi-breakeR. Keep their good will and lower your outage costs.

The Square D Multi-breakeR eliminates the need for fuses—substitutes a flip of a lever. It provides circuit breaker protection at low cost. It is safe and tamper-proof. It can be installed for only a trifle more than the conventional service entrance switch and fuse box.

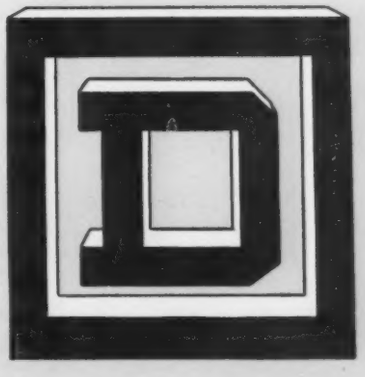
Power companies, for their own protection, should be particularly active in encouraging the use of Square D Multi-breakeRs by rural customers. Many Utilities, also, have found that the Square D Multi-breakeR is a decided sales asset in range and water heater campaigns.

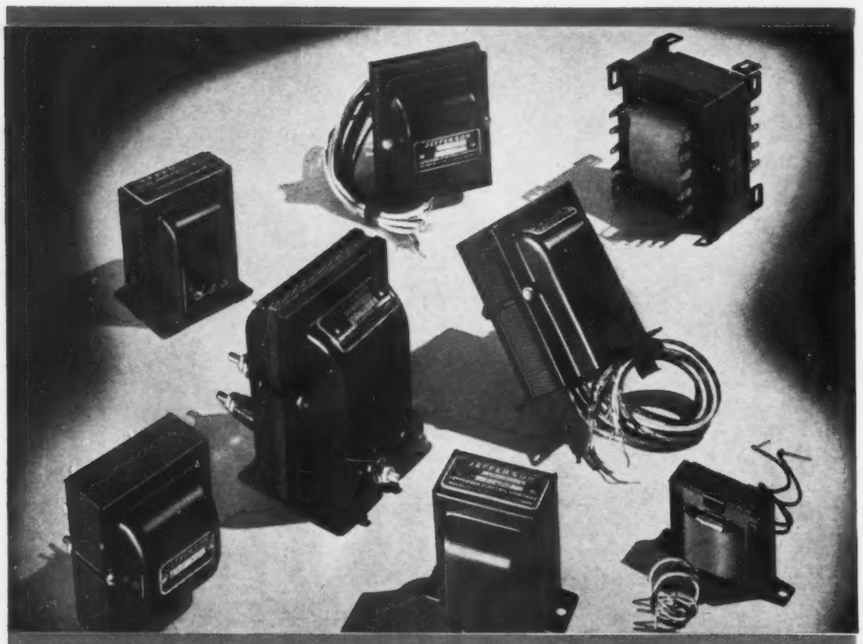
SQUARE D COMPANY

DETROIT - MILWAUKEE - LOS ANGELES

SQUARE D COMPANY CANADA LTD. TORONTO, ONTARIO

CALL IN A SQUARE D MAN





TRANSFORMER LEADERSHIP

The "Jefferson" name on radio transformers has become recognized as the stamp of excellence in design and construction . . . Jefferson engineers have contributed toward the practical application and improvement of small transformers for many other purposes also!—for

- Oil Burners
- Street Lighting
- Neon Signs and Illumination
- Signal Systems
- Mercury Lamps
- Relays
- Temperature Controls
- Motor Controls, etc., etc.

And Jefferson production facilities match Jefferson research and engineering facilities—truly maintaining leadership in the specialized small transformer industry.

If you have need for small transformers for secondaries of thousands of volts—or extra low voltages—let Jefferson Electric engineers make recommendations. JEFFERSON ELECTRIC COMPANY, Bellwood (Suburb of Chicago), Illinois. Canadian Factory: 535 College St., Toronto.

JEFFERSON TRANSFORMERS

It's the Woman Who Pays

[*Continued from page 55*]

the household purchasing agent, the phrase "Mrs. Consumer" is now quite in order.

All the foregoing suggests that the much-needed consumer education be directed to that ephemeral thing called "The Woman's Viewpoint." And why not, since women are spenders of the major part of the national income? Woman's interest today reaches into the administration of government, into corporate management, into economic and cultural values of consumer's goods and services, all of which bear directly on utility well-being.

I know whereof I write because for some time I have been engaged in speaking before women's clubs. Invariably I attempt to engage my audiences in discussions of public service questions. They are sincerely interested in these discussions, which bring to the surface many inadequately schooled viewpoints. Many times I have wished that local utility executives could be present at these discussions and help answer the ever-recurring questions of "the shoppers of the nation":

Why are our rates so high?

Why aren't rates the same all over the U. S.?

Wouldn't government ownership lower and level out rates?

Why the sliding rate?

Why the area charge?

What is demand charge?

Why don't meters register in direct reading numbers?

My observation has been that Mrs. Consumer's sense of bargaining hasn't been concentrated on electricity.

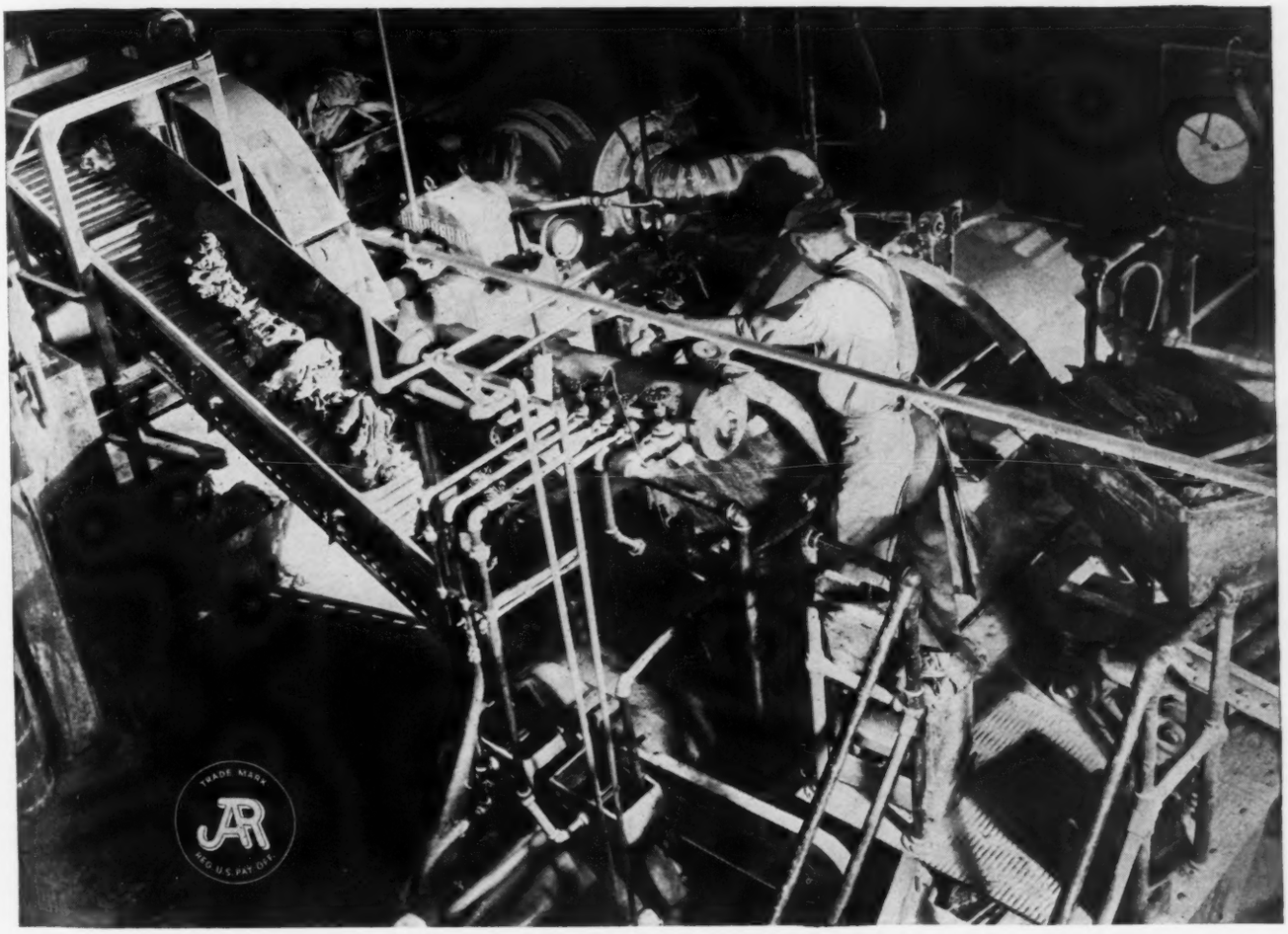
A few years ago a large utility investigated the viewpoint of several thousand consumers. Forty-one per cent didn't know that their rates had been reduced three times in a couple of years. Mrs. Consumer didn't realize she was getting a *bargain* in rates. Nor did 80 per cent know their rates were below the state average. Again Mrs. Consumer didn't know she was getting a *bargain*.

Some one ought to write to her about the bargains the power company offers.

I am convinced that the matter of peaceful public relations is a friendly little problem to be worked out between "Mrs. Consumer" and "Mrs. Director."

One of the *Last Words* in Roebling Rubber Cable Making

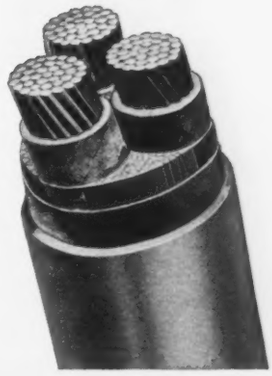
. . . A BANBURY MIXER



THIS maze-like Banbury Mixer assures superior rubber stock for Roebling Cable insulation. It is typical of Roebling's improved methods in the making of rubber insulated cables. From copper conductor to outer covering, closest control over material and methods guard the high quality of Roebling Power Cables every step of the way.

These cables are made in several types. We will be glad to submit samples and prices on whatever type in the following list which may interest you.

Roebling Rubber Insulated Cables are made in a wide range of sizes, voltages and grades of insulation suitable for power transmission, lighting and signal service —underground, submarine or aerial. The complete line includes "SAFECOTE" Rubber Insulated and Braided Wires and Cables. Parkway, Service, Mining, Welding and Control Cables. TreeWire.



JOHN A. ROEBLING'S SONS CO.
TRENTON, N. J. *Branches in Principal Cities*

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

Manufacturing AND MARKETS

Westinghouse to Get A. B. See Elevator Co.

Westinghouse Electric & Manufacturing Company will acquire the A.B. See Elevator Company, Inc., through an exchange of shares, it was revealed last week when F. A. Merrick, Westinghouse president, made application to the Stock Exchange to list 5,814 additional shares of its $50 par value common stock.

This stock, together with 4,186 shares in the treasury, with par of $500,000, will be used to acquire A. B. See. In the application Westinghouse stated that A. B. See assets will be taken over at book value, estimated at $1,068,000.

It was reported that after holders of 5,430 of A. B. See first preferred shares had received $100 a share in Westinghouse stock, taken approximately at $150 a share, the balance of Westinghouse shares would go to holders of 18,614 common shares. The See family owns the common stock of the elevator company, while officers and employees own all the first preferred shares.

Under the plan all officers and employees will continue at work under the new owners of the company.

•

Carrier Corporation Buys Franklin Plant at Syracuse

Carrier Corporation recently bid in at public auction by L. R. Boulware, vice-president and general manager, the former Franklin plant at Syracuse, N. Y. The plant, which occupies 1,250,000 sq.ft., was taken over recently by the city for taxes. Carrier expects to shift 80 per cent of its administrative and productive operations to Syracuse within a year.

The company's volume of business during the past spring season was over twice that for the same period last year, Mr. Boulware said. This production schedule so taxed present facilities, he said, that it was necessary to provide more space for next spring if the company expects to enjoy further expansion.

•

Orders for Air-Conditioning Equipment Show Gain in May

Value of orders booked for air-conditioning systems and equipment in May were valued at $6,472,804, as compared with $4,650,681 in the same month last year, the Department of Commerce reports. In April these orders were valued at $6,538,431.

For the five months ended May 31 orders were valued at $31,420,627, as against $16,703,669 for the same period last year.

•

Electric Truck Shipments Increase 79% During May

Shipments of electric trucks and tractors during May surpassed those of the like month a year ago by 79 per cent and comprised nearly 2½ times as many units as in May, 1935. The number as reported by the Bureau of the Census was 162. The total for the first five months of this year was 759, as against 451 in 1936 and 301 in 1935.

While shipments decreased last year from 112 in April and two years ago, from 75, the number was identical for the two months in 1937.

•

Completes Expansion Plan

The Copperweld Steel Company recently announced that its plant expansion program, costing more than $500,000 and under way since January, 1937, is virtually completed.

Gain in Orders Shown by General Electric

Orders received by General Electric Company during the first six months this year totaled $217,265,619, as against $136,968,597 in the same period last year, an increase of 59 per cent, according to Gerard Swope, president. The record first half was in 1929, when orders received amounted to $220,716,456.

Orders received during the second quarter totaled $111,518,589, as against $77,398,718 in the same quarter last year, an increase of 44 per cent. The second quarter was the largest since the third quarter of 1929.

During the first quarter this year the company received orders totaling $105,747,030, as against $59,569,879 in the same 1936 quarter, an increase of 78 per cent. Sales billed showed an increase of 43 per cent, totaling $73,412,420, against $51,423,071 in the first quarter of last year.

•

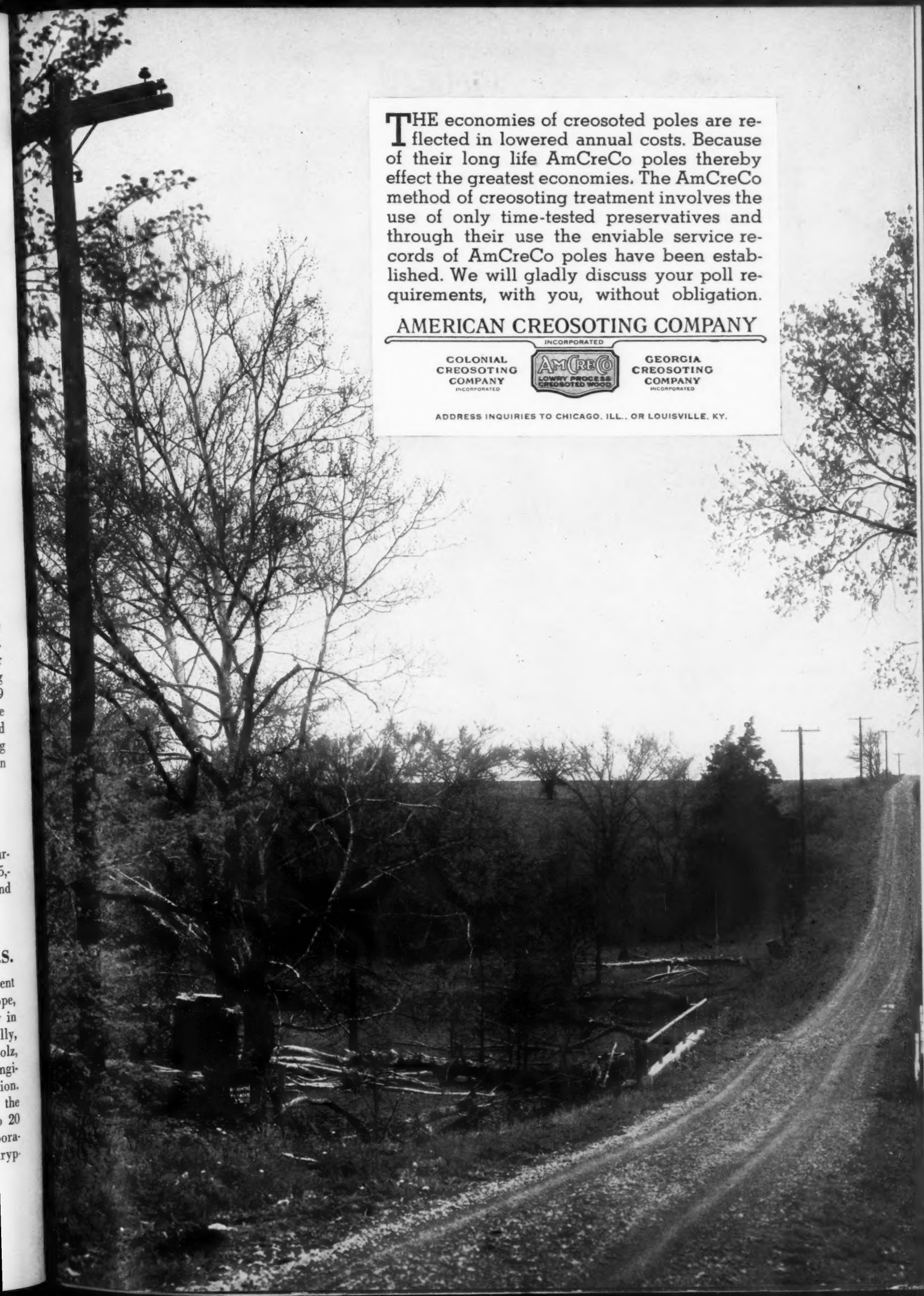
Sales of Vacuum Cleaners

The Vacuum Cleaners Manufacturers Association reports sales of 125,921 floor cleaner units for May and 42,688 hand cleaner units.

•

Krypton-Filled Lamps for U.S.

The krypton-filled incandescent lamp, commonly used in Europe, could save consumers of electricity in this country $32,000,000 annually, according to Dr. Emanuel Epielholz, chief technical consultant and engineer of the Duro-Test Corporation. He stated that krypton increases the efficiency of an electric light bulb 20 per cent. The Duro-Test Corporation plans to produce its own krypton gas in the near future.



THE economies of creosoted poles are reflected in lowered annual costs. Because of their long life AmCreCo poles thereby effect the greatest economies. The AmCreCo method of creosoting treatment involves the use of only time-tested preservatives and through their use the enviable service records of AmCreCo poles have been established. We will gladly discuss your poll requirements, with you, without obligation.

AMERICAN CREOSOTING COMPANY

INCORPORATED

COLONIAL CREOSOTING COMPANY INCORPORATED

AMCRECO LOWRY PROCESS CREOSOTED WOOD

GEORGIA CREOSOTING COMPANY INCORPORATED

ADDRESS INQUIRIES TO CHICAGO, ILL., OR LOUISVILLE, KY.

General Electric Plans Large Plant Expansion

General Electric Company will increase by more than 50 per cent by August 1 the facilities at the Bridgeport plant for the manufacture of rubber-covered wire, cable and cord, according to C. E. Wilson, vice-president.

R. C. Wilmot was appointed managing engineer for wiring materials of the Bridgeport Works. H. H. Watson was appointed designing engineer for wiring devices and C. H. Barker supervisor of production with responsibility of co-ordinating the production activities at Bridgeport and branch works, according to W. Stewart Clark, manager.

•

Allis-Chalmers to Expand

Allis-Chalmers Manufacturing Company plans to spend between $3,000,000 and $4,000,000 on plant expansion and improvement this year, Gen. Otto Falk, board chairman, said. First step, which has been definitely decided upon, is reconditioning of the West Allis boiler house at Milwaukee at a cost of $800,000. It is proposed to spend about $1,000,000 at La Crosse and between $1,000,000 and $2,000,000 for additional production of farm tractors, new machinery and equipment in West Allis or at some other company plant.

•

Emerson Injunction Dropped

The injunction suit of the Emerson Electric Manufacturing Company against officers and members of Local 1102 United Electrical and Radio Workers of America, filed in Circuit Court during the 53-day sit-down strike at its plant in St. Louis, Mo., has been dismissed by the company at its cost. Strikers evacuated the plant April 28, but picketing continued until May 14, when a settlement was reached recognizing the CIO affiliate as the representative of employees for collective bargaining.

New York Metal Prices

	July 7, 1937 Cents per Pound	July 13, 1937 Cents per Pound
Copper electrolytic	14.00*	14.00*
Lead Am. S. & R. price	6.00	6.00
Antimony	14.125	14.75
Nickel ingot	35.00	35.00
Zinc spot	7.10	7.35
Tin Straits	56.35	59.25
Aluminum, 99 per cent	20–21	20–21

* Delivered Connecticut Valley.

Field Reports on Business

Industrial activity, following the holidays last week, has shown a decided upturn, with steel production in the van. Electric equipment is showing a pick-up which is encouraging. Appliance sales are going well, with fall campaigns being planned on an expanded scale.

NEW ENGLAND

Sales of electrical equipment in New England during the past week were very encouraging in view of the short week, due to the holiday, and rather adverse weather conditions. A slight drop in the volume of motor orders is reported; central station supplies are uneven, though one distributor notes a stronger trend than a year ago. Authorization for three 500-kva. transformers for the Auburn substation and three 250-kva. transformers for the Millbury substation has been announced by the Worcester Suburban Electric Company. The Northampton Electric Lighting Company is adding a new 13-kv. line 5.4 miles long to serve Williamsburg and Leeds.

The Kenmore Hotel, Boston, has purchased four Hotpoint Electric ranges and miscellaneous high-temperature cooking equipment aggregating 125 kw. for modernizing its kitchen. As the result of recent surveys of traffic conditions on state highways electrically controlled traffic signals will be installed at a cost of about $5,000 in eastern Massachusetts.

Construction supplies are moving steadily; new all-electric home construction is progressing in suburban Boston areas. Recently 49 homes fully equipped with major electric appliances were put on the market. Merchandising in eastern Massachusetts is very encouraging; in Vermont more than 100 refrigerators and 50 ranges were sold last week. Fan stocks were nearly exhausted in Boston during the hot spell.

Boston Edison has asked bids by next week for one 1,400-lb. boiler unit, capacity 400,000 lb. per hour, to increase the capacity of the Edgar Station.

NEW YORK

Uncertainty and extreme caution are giving way to a more optimistic outlook for good fall business. A checking of second quarter reports has revealed that the volume of industrial production was relatively high during the first six months, even in face of widespread C.I.O. strikes and the closing of many plants.

There is evidence that summer dullness will be of less duration than had been anticipated as plants are speeding production to catch up on present orders. Many are of the opinion that third quarter reports may make much better reading than had been thought a short while ago.

Retail outlets report a fair volume of electrical appliance sales. Many utilites are concentratng their sales efforts on air-conditioning equipment which have been aided materially by the heat wave. Refrigerators and electric ranges are selling at an encouraging rate.

General Electric's report of an increase of 59 per cent in orders received during the first six months over a year ago indicates the activity in the electrical manufacturing field.

Load-building activities of the utilities so far this year are now showing to advantage in the high rate of power use. Output for the industry is being maintained well above last year with residential use expanding.

PACIFIC COAST

Volume of Pacific Coast building permits for June was about 10 per cent below May and 5 per cent above June, 1936, the decline being chiefly chargeable to a drop in residential construction, though balance was somewhat restored by increased building in Pacific Northwest. PWA is limiting its two years of remaining life to the completion of pending and sufficiently planned jobs. Local communities have contributed 68 per cent of PWA jobs costs.

Recent large specific orders include three carloads of copper for buses and grounds on Los Angeles yearly contract; six 200-kva., 2,400-volt transformers for Boulder; $6,078 for Sacramento traffic signals; $44,404 for Westinghouse circuit breakers for Los Angeles; $4,500 for cable for San Diego, $20,634 for electric crane for Seminoe power plant, and an $88,000 REA award for an 81-mile distribution system in Cowlitz area, Washington.

Wholesalers report seasonal lag in country business largely due to salesman's vacatons. Retail trade in Bay area is rather poor because of 100-day San Francisco hotel strike and department store attempted unionization. Increased cannery pay demands may affect many interior cities and towns, though drive is being sponsored by A. F. of L. Sizable purchases of poles and line hardware are reported for central stocks by various power companies. Pacific Gas & Electric Company is building a new 11-kv. substation in San Jose and is increasing its distribution capacity in Dredger and mining area around Sacramento.

Considerable activity is being manifested in hotels and larger apartment houses such as a $600,000 apartment house for Beverly Hills, a $300,000 Los Angeles apartment house, a $500,000 Eureka combined hotel and chain theater, considerable additions to Reno and Los Angeles Hotels and a five-million-dollar racing and recreation plant at San Pablo.

CHICAGO

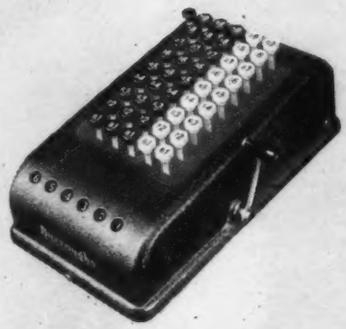
The tone of business in this district improved durng the past week. Although the volume of activity was lower because of the holidays, various factors indicated that the trend in several lines was again upward. Heavy buying in the wholesale markets lent encouragement and hot weather helped to maintain the rapid turnover in summer lines. Electric fans and cookers continued to sell at a high level.

Utilities serving this area reported increased earnings for June, continuing the gains made over last year. Air conditioning installations are more numerous, averaging approximately 25 per cent higher than last year. Cabinets, panelboards and rectifiers are moving in good volume. Manufacturers report a good demand for small motors and switches. Wire and cable sales are steady and central station supplies are holding up well.

Industrial activity is slow and building construction is disappointing, the high costs proving to be quite a drag. Farm implement manufacturers are working at top speed supplying the demand.

Burroughs

NEW FEATURES *in the* ENTIRE LINE OF BURROUGHS CALCULATORS



A small six-column calculator for handling small amounts. It assures low equipment costs where a machine of larger capacity is not required.

The many styles of Burroughs Calculators include machines of six, ten and fourteen column totaling capacities, fractional keyboards, electric or hand operation.

Burroughs Electric Calculator with Simplified Subtraction. New speed, new quiet operation, new style. Ten and fourteen column capacities.

new

ELECTRIC DUPLEX CALCULATOR

TWO TOTALS

The individual totals in the front dials are transferred electrically to the rear dials where they accumulate into a grand total.

DIRECT SUBTRACTION

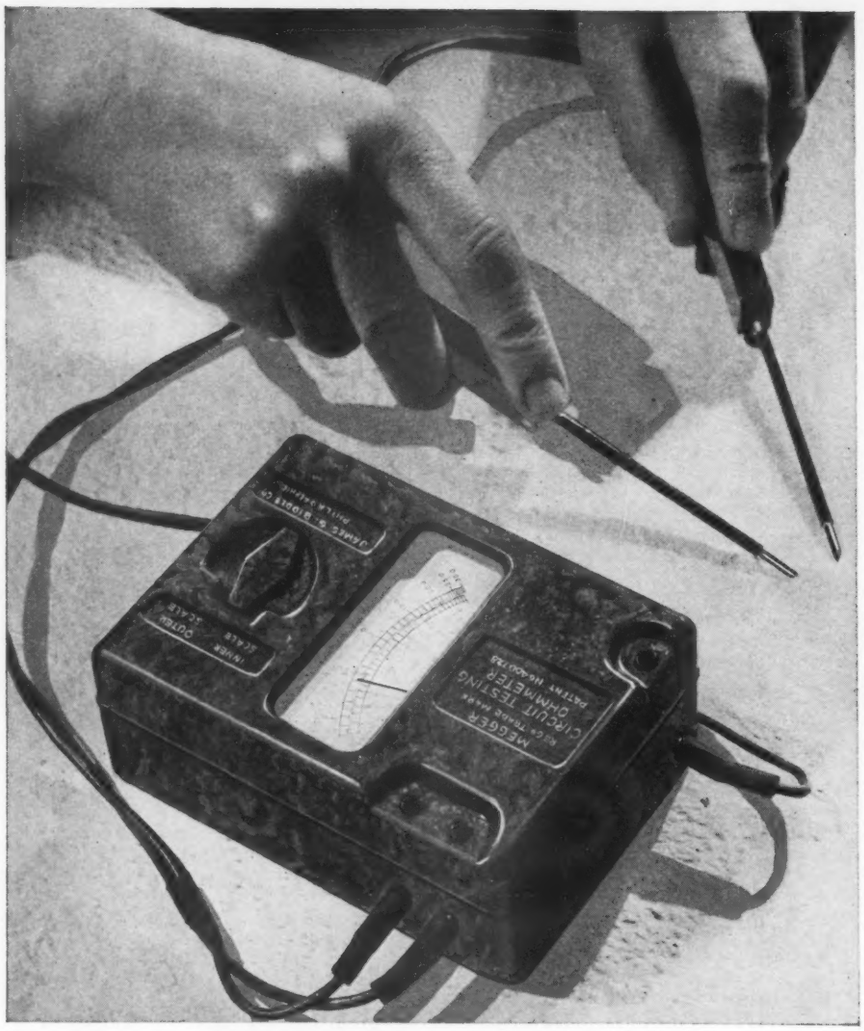
A mere touch of this key subtracts an amount directly from the grand total without the use of complements.

FAST . . . QUIET ELECTRIC

Provides a faster, simpler way to accumulate individual calculations into a grand total. Direct subtraction, fast electric transfer, electric clearance, and positive electric key touch speed up the work and enforce accuracy. Other Burroughs Calculators of various totaling capacities also have new features, new advantages and new styles; thus, you can select the one that will give you the shortest, simplest operation on your particular job. For a demonstration or complete information, telephone the local Burroughs office, or write—

BURROUGHS ADDING MACHINE COMPANY
6157 SECOND BOULEVARD, DETROIT, MICHIGAN

THERE'S A BURROUGHS CALCULATOR FOR EVERY TYPE OF CALCULATING



"MEGGER" *Presents* a New and Unusual Type of Portable Ohmmeter

. . . for the man who needs something definitely better than instruments heretofore available . . . something more dependable, more accurate, with which to measure resistance in coils, contacts, circuits, relays and other equipment.

The MIDGET "MEGGER" CIRCUIT TESTING OHMMETER is a true "Megger" Cross-Coil Ohmmeter (not just a voltmeter calibrated in ohms). It requires no adjustment for battery voltage. Has remarkably wide ranges . . . from .1 ohm to 200,000 ohms. Has remarkably low ranges—0 to 3 ohms full scale, reading to .02 ohm.

This new and different kind of portable ohmmeter is a rugged instrument — built to "Megger" quality standards. It is long-lived, reliable, accurate—an instrument that "trouble shooters" are finding of utmost value.

Engineers, maintenance men, elevator inspectors, railway signal men, service men in radio and electrical repair shops find a thousand and one uses for it. Bulletin 1495-W tells all about the Midget "Megger" Circuit Testing Ohmmeter. Send for a copy.

JAMES G. BIDDLE CO.
ELECTRICAL AND SCIENTIFIC INSTRUMENTS
1211-13 ARCH STREET PHILADELPHIA, PA.

National Power Sales Advertising Gaining Favor

[*Continued from page 53*]

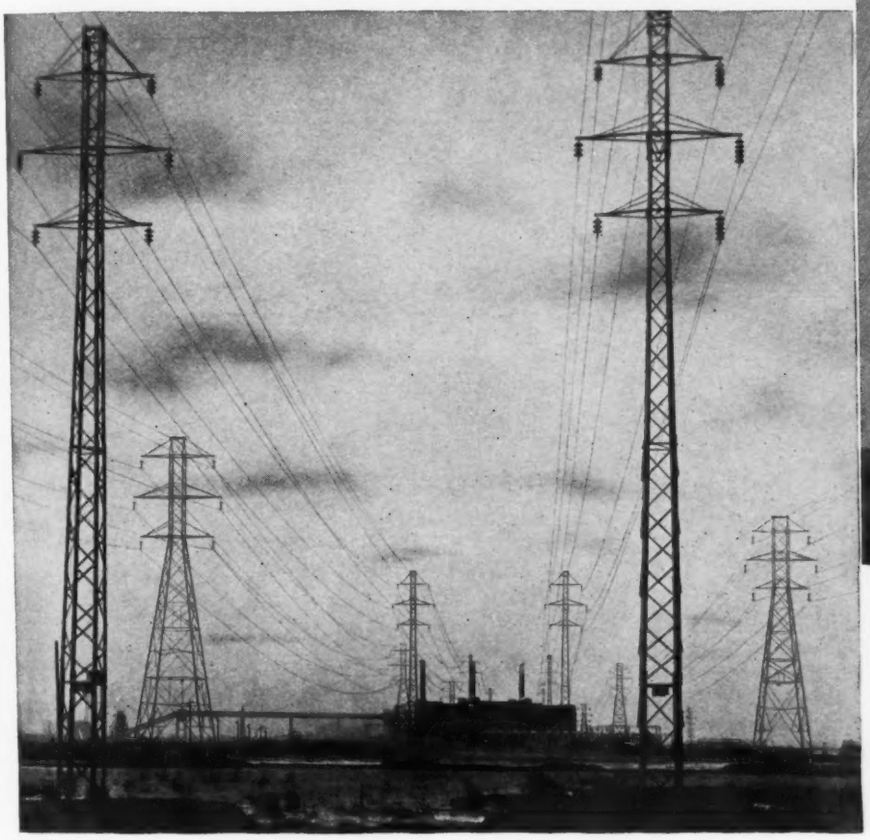
the committee in soliciting signatures to the "conditional contracts" will virtually be taking a referendum vote on the attitude of the industry on the project. The plan of action as set forth in the contract provides for the erection of a permanent organization to be set up by the participants for the determination and administration of the advertising and publicity program, the present National Power Sales Publicity Committee being simply a promotion device.

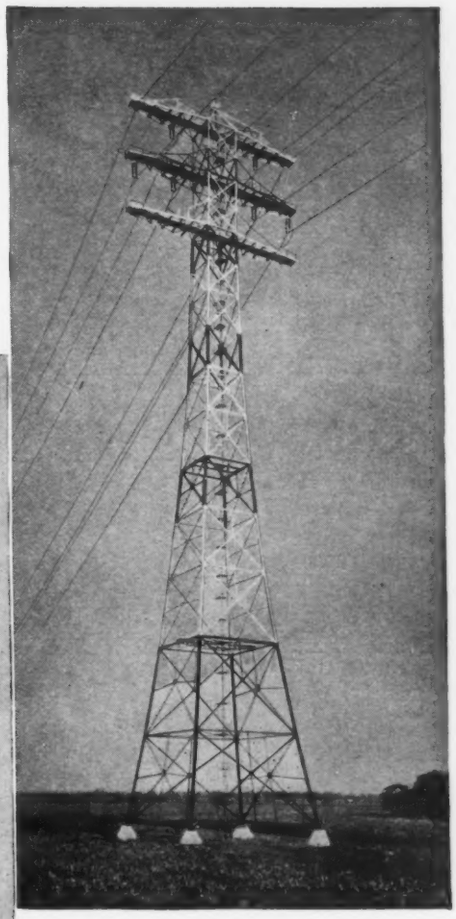
Discussions of the subject that have taken place since the promotion of the national power sales advertising idea began have caused some companies to analyze their advertising expenditures in relation to sales to classes of customers. In practically all cases these analyses show that commercial and industrial power sales promotion is getting an indefensibly trivial share of the advertising appropriation in proportion to the volume and proportion of business it represents. The proposed program would cost less than forty cents for each thousand dollars of power sales revenue. Compare this with the 50 cents to $1 spent annually per domestic customer whose yearly average bill is less than $35.

Must be national campaign

Probably the biggest—and the least recognized—part of the reason for the pitiably small amount of money spent for advertising power in comparison with expenditures for other classes of business is the fact that power selling cannot be handled by local advertising except at excessive cost. It is obviously wasteful to use space for such a purpose in the local newspaper because 90 per cent or more of the readers are wholly uninterested. The limitations of direct-mail advertising are soon appreciated. And the result is that power gets little advertising or none at all. The only answer is national advertising in media carefully selected to reach the buyers of commercial and industrial power. This, of course, requires collective action by the utility industry. But is that so hopeless? How many co-operative promotion programs on a national scale are the electric utilities working on right now? "Better Light—Better Sight," "Kitchen Modernization" and

Always Look to
AMERICAN BRIDGE COMPANY
for TOWERS





Mississippi River Crossing of the Baton Rouge Electric Company carries power lines 3750 feet between towers. Crossing designed by Stone & Webster Engineering Corporation. Steel towers fabricated and erected by American Bridge Company.

Left Power lines of various voltages radiating from the Deepwater Power Plant in New Jersey.

THE growth of electric transmission lines, spreading fanwise from hundreds of strategically located generating plants, symbolizes our national development. These lines bring service — light, heat and power—to industrial centers and rural districts.

Like other construction works that span rivers, mountains and wide stretches of plains, the design of efficient transmission tower systems involves many and varied engineering problems. Since 1905, these problems have been handled by American Bridge Company in its design, fabrication and erection of steel structures of all types for electric transmission. Its engineering and operating organizations have kept pace with every development and have devised new features and special adaptations which result in more economical and effective design and construction.

One entire plant is devoted to the fabrication and galvanizing of towers, and also provides modern facilities for full-size tower testing. Always look to American Bridge Company's resources and services to handle your tower requirements with greatest efficiency.

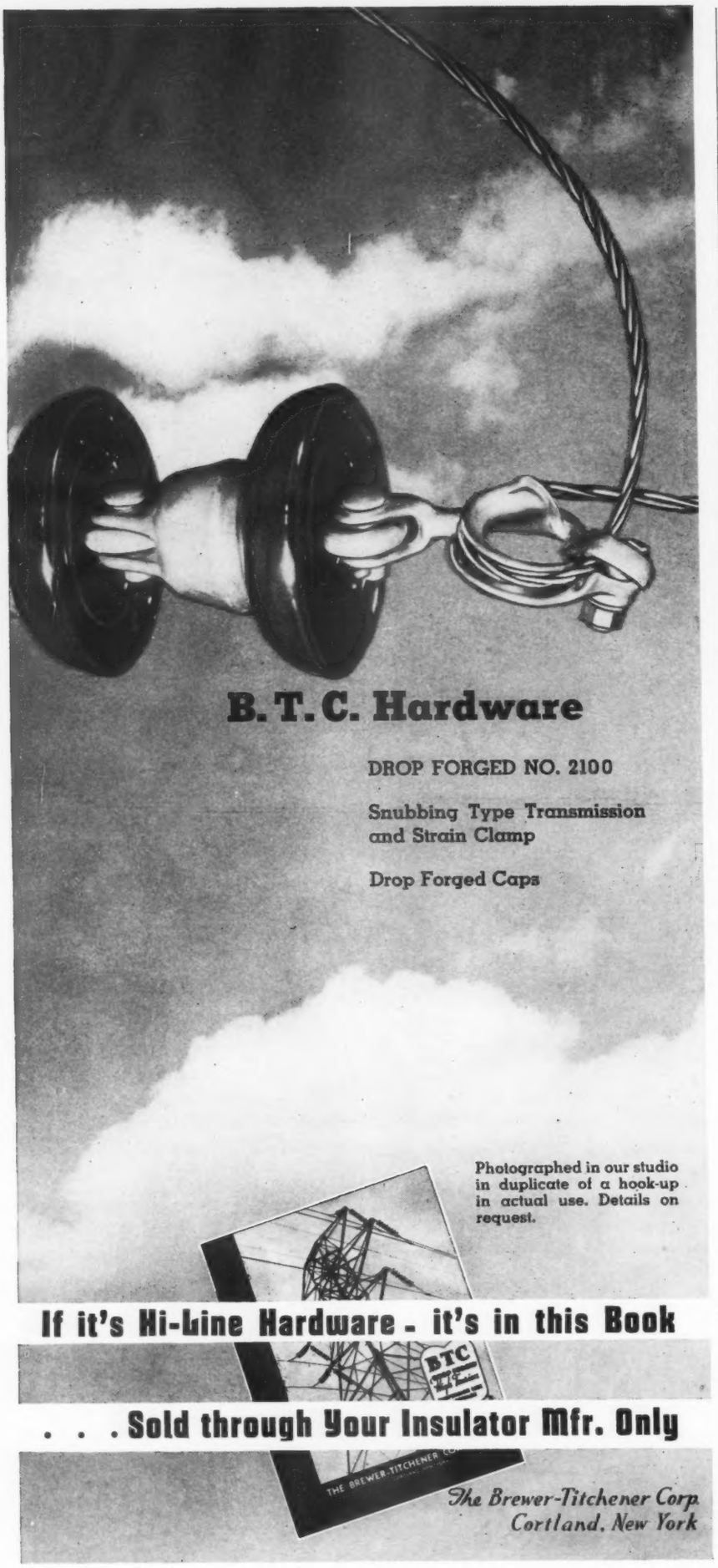
AMERICAN BRIDGE COMPANY

General Offices: Frick Building, Pittsburgh, Pa.

Baltimore · Boston · Chicago · Cincinnati · Cleveland · Denver · Detroit
Duluth · Minneapolis · New York · Philadelphia · St. Louis

Columbia Steel Company, San Francisco, *Pacific Coast Distributors* · United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL


B. T. C. Hardware
DROP FORGED NO. 2100
Snubbing Type Transmission and Strain Clamp
Drop Forged Caps
Photographed in our studio in duplicate of a hook-up in actual use. Details on request.
If it's Hi-Line Hardware - it's in this Book
BTC
. . . Sold through Your Insulator Mfr. Only
THE BREWER-TITCHENER CO.
The Brewer-Titchener Corp.
Cortland, New York

others come to mind. These have the active sponsorship of manufacturers and national power sales advertising will not have that. But what of it? Is the utility industry incapable of action without the spur of outside interest? We see on every hand eloquent evidences of the practicality and effectiveness of co-operative advertising. If co-operative advertising can be employed by other groups, why not by the electric utilities?

Propaganda? No

The very first argument that arises in the utility man's mind against the idea of national power sales advertising is that it will be interpreted as "power trust" propaganda.

In this connection it cannot be too often nor too forcefully repeated that the single and only purpose of national power sales advertising as conceived in the present program is to sell central-station power service. The utilities have a service to sell, a service that is meeting competition that rests on perfectly worthy technical accomplishment. If the advertising is designed to do that job well it will have neither space nor interest for any ulterior purpose.

The whole story

The whole matter comes down to a very simple statement. About 60 per cent of the entire gross revenue of the electric utility industry comes from classes of business in which the entire dependence for retention and growth of business rests on a single agency—personal selling. Personal selling, well grounded in the tradition of the industry as it is and effective as it was in the past, is not today adequate for the job of power sales. It must be reinforced and supported by the other selling instruments of advertising and publicity if it is to hold and gain ground against the forces of competition and of inspired prejudice. Local and direct mail advertising are neither wholly suited nor entirely sufficient for the job. The only answer is advertising on a national scale which must, by the nature of the industry, be co-operative. We are optimistic enough to believe that the industry is now ready for a national power sales advertising campaign, that the program *can* be carried out and that that commercial and industrial power is about to receive the advertising attention it deserves.

MICA *stands alone!*

WHEN all of the destructive enemies of permanent insulation combine, then one, and *only* one, insulating material can be safely used. That material is Mica. Other materials may give adequate protection under limited demands—but to meet the continued attacks of heat, friction and moisture, mica stands alone.

Macallen Mica is promptly available in numerous commercial forms. It is processed into all thicknesses—rigid—flexible for cold bending—specially prepared for punching or molding—cut or formed to exact shapes to order. Consult our engineering department on your technical requirements.

THE MACALLEN COMPANY

16 MACALLEN ST., BOSTON, MASS.

Chicago: 565 W. Washington St. Cleveland: 902 Leader Bldg.

COMPRESSED SHEET • MICA PAPER, CLOTH, TAPE • HEATER PLATE • COMPRESSED SHEET TUBING • COMMUTATOR INSULATION • COMPRESSED SHEET WASHERS • INSULATING JOINTS AND CANOPY INSULATORS • RAILWAY SPECIALTIES • DOMESTIC AND IMPORTED RAW MICA

If you buy the best in *transformers*

You'll want the best in POWER CONNECTORS

Though they represent but a small part of your substation investment, Burndy Power Connectors play a big part in safeguarding that investment. Their rugged strength, high conductivity and corrosion-resistance prove that it pays to specify the manufacturer who specializes in electrical connectors.

Left: Type XD—an expansion connector for joining tubing to threaded stud. Absorbs the shock of breaker operation and the strain imposed by settling foundations and changes in tubing length due to thermal expansion. Internal alignment guide permits free longitudinal motion and limited lateral motion of bus.

BURNDY
ENGINEERING CO., INC.
459 E. 133d STREET (B) NEW YORK, N. Y.

2,000 Rural Miles in Twelve Months

[*Continued from page 52*]

and the voltage drop on the common neutral generally prohibits long secondaries.

SERVICES—Services are of No. 8 triple-braid, weatherproof copper for a two-wire installation and of No. 6 triple-braid, weatherproof copper for three wire. Such services are generally of not more than 100 ft. in length.

METERS—Customer meters are installed outside near the front of the house where houses are near the road. Otherwise pole meters are used. Armored service-entrance cable to the meter is used and the customer's circuit is brought to the back of the meter socket wherever possible.

TRANSFORMERS—Single-bushing type rural transformers in 1 kva. and 3 kva. sizes are used on 2,400/4,160Y and 7,200/12,470Y volt lines where the common neutral is available. These transformers are protected by spillway gaps on the high-tension side and with built-in, primary fuse links. The secondaries of 1-kva. transformers are protected by 20-amp. secondary fuse links installed in the jumper leads. The 3-kva. transformers are protected by 25-amp. secondary breakers. Rural transformers larger than 3 kva. in size are usually of the surge-proof type with full, built-in protective equipment.

FUSES—Rural lines of more than 2 or 3 miles in length are protected usually by three-shot repeater fuses at the beginning of the line. The fuse links in these switches are carefully co-ordinated with the oil circuit breakers feeding the main circuits to insure the fuse links blowing ahead of the operation of the breakers.

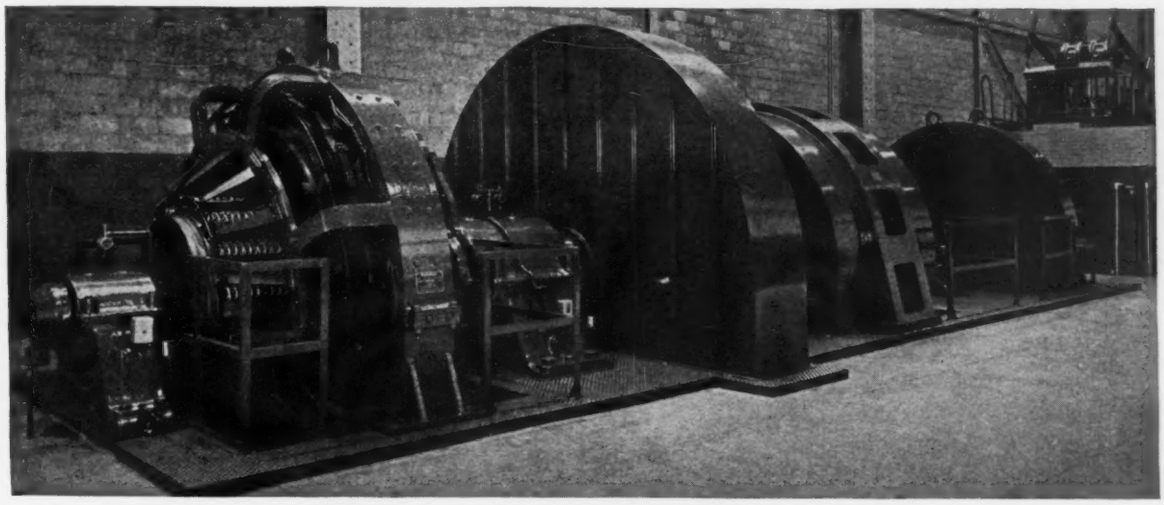
COSTS—The cost of this 7.2-kv. ridge-pin common neutral line (primary line only) including surveying, mapping, engineering and overhead charges is about $495 per mile when No. 4 ACSR is used with 400-ft. ruling spans. Where No. 6 steel (of 80,000 lb. per square inch ultimate strength) is used for primary and neutral conductor on 400-ft. ruling spans a mile can be built for about $415. With No. 6 steel (of 130,000 lb. per square inch ultimate strength) on 600-ft. ruling spans a mile can be built for about $385.

RIGHT-OF-WAY—Private right-of-way is usually furnished by customers living along the line. Where this is not easily obtainable the lines are built on county roads.

•

Speeds Electric Project

Electrification of additional trackage of the Pennsylvania Railroad Company in the territory to be fed jointly from the operating system of Pennsylvania Water & Power Company, Consolidated Gas, Electric Light & Power Company of Baltimore and Safe Harbor Water Power Corporation is moving forward rapidly, J. A. Walls, president of Pennsylvania Water & Power, reports. Mr. Walls said that this work calls for extensions to be made to the company's transmission equipment. This work is being carried out without the necessity of resorting to new financing.



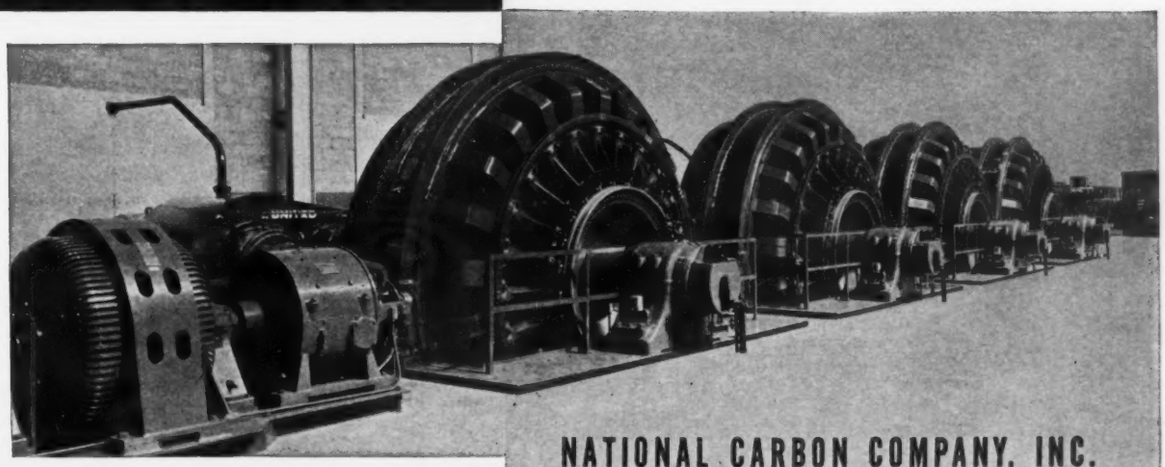
MILL DRIVE EQUIPMENT

for New Plate Mill in Pittsburgh District

"SA"

SERIES BRUSHES

will give outstanding performance on YOUR equipment, as they do on mill drive equipment in this new plate mill.



NATIONAL CARBON COMPANY, INC.

Unit of Union Carbide UCC and Carbon Corporation

CARBON SALES DIVISION, CLEVELAND, OHIO

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PEMCO UNITS

selected to light the

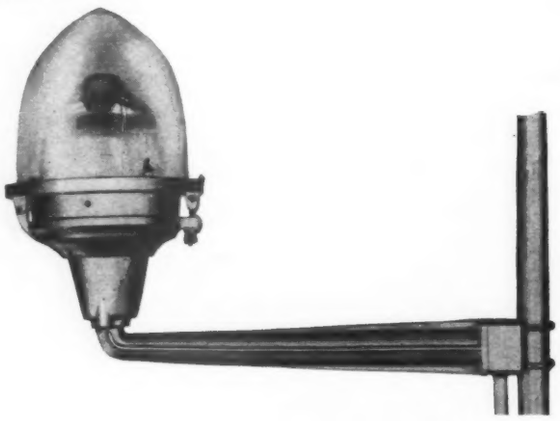
BOULDER DAM Sub-Station

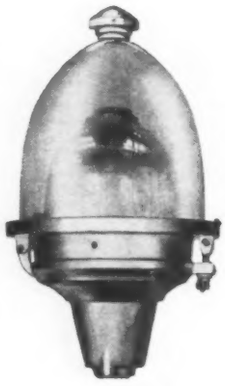
and the Sub-Stations of Most Leading Utility Companies

The Pemco Sub-Station Lighting Units are not merely inverted lighting units, but are scientifically designed units with refractors for proper light distribution to switches and the ground without detracting from the upward light. An external focusing adjustment and hinged globe ring for easy relamping add to the practicability of the Fixtures.

No. 528 Sub-Station Light for 300 watt lamp, either in galvanized iron or aluminum.

No. 203 Bracket Arm in either malleable iron or aluminum. 24" extension.





No. 528B Ventilated Sub-Station Unit (left) for use with 500 watt lamp.

No. 526 Sub-Station Unit (right) to be used in locations where additional ground light is required.

For prices and more detailed information address

Phila. Electrical and Manufacturing Co.

1222-36 N. Thirty-First Street **Philadelphia, Pa.**

Recent Rate Changes

CONOWINGO POWER COMPANY has announced a rate reduction which will benefit consumers to the extent of approximately $19,000 a year. The announcement was made following a series of informal conferences between the officials of the company and members of the Maryland Public Service Commission. Most of the rates for household use remain unchanged, but changes will be made in the number of kilowatt-hours to which these rates apply.

LOS ANGELES City Council has approved a reduction in rates charged by the Bureau of Power and Light which will amount to approximately $1,250,000 annually.

NEW YORK STATE ELECTRIC & GAS CORPORATION has filed with the state Public Service Commission reduced rates for residential, general and power service in parts of Westchester, Putnam and Dutchess counties. Residential service is now furnished under an area rate for annual service, another area rate for seasonal service and the general rate. The two area rates are replaced by a block rate which will be the same or lower than the area rates and the general rate is eliminated as the block rate now effective will be the same or lower. The three rates are replaced by one rate for residential service which has an initial charge of $1.00 for the first 8 kw.-hr. or less, 8 cents per kilowatt hour for the balance up to 38 kw.-hr., 5 cents per kilowatt-hour for the next 62 kw.-hr., 3 cents per kilowatt-hour for the next 100 kw.-hr. and 2 cents per kilowatt-hour for excess use. There is a minimum charge of $1 for the first 10 kw. or less of demand and $3 per kilowatt for additional demand. In addition to the general rate, general service is furnished under an optional demand rate. The schedules also provide a reduction in the demand charge in a primary voltage power rate for demands in excess of 50 kva.

SALAMANCA, N. Y., has filed revised electric rates with the New York Public Service Commission which are estimated to save consumers of the municipal plant $18,266 annually. The new schedules provide reduction in residential and general and power rates.

WISCONSIN PUBLIC SERVICE COMMISSION has announced rate reductions totaling approximately $11,000 a year for the Shawano city electric utility. Under the new rates home users of electricity will have a schedule providing a 60 cents fixed charge plus 20 kw.-hr. at three cents each, the next 80 at 2.5 cents and all over 100 at two cents. New rural rates provide for a 75 cent fixed charge plus 50 kw.-hr. at 3.5 cents each, the next 150 at three and all over 200 at 2.25 cents.

WISCONSIN PUBLIC SERVICE COMMISSION ordered or authorized on June 22 electric rate reductions totaling almost $300,000 for users in central, northeastern and northwestern Wisconsin. Companies affected are the Wisconsin Power & Light Company, $160,000; Wisconsin Public Service Corporation and its subsidiary, Menominee & Marinette Light & Traction Company, $84,300 and Lake Superior District Power Company, $47,550.

PASADENA BOARD OF CITY DIRECTORS has approved reduction in rate schedules of the municipal light and power department, totaling $96,607 a year. The reduction will be based on the following individual class reductions: Four and three-tenths per cent residential lighting, 15.2 per cent light for commercial or business places, 6.3 per cent municipal lighting, 8 per cent residence power, 8.2 per cent power for commercial

TALKS ABOUT CONDENSER TUBES*

FABRICATION

TUBE EXTRUSION PROCESS—NO. 1:
Billet is placed in the container.

TUBE EXTRUSION PROCESS—NO. 2:
Billet is held in place by the ram while the mandrel forces out center portion of the billet.

TUBE EXTRUSION PROCESS—NO. 3:
Ram advances and forces the metal in the billet to flow between the mandrel and die. The rough surface skin of the billet is not pushed out and remains in the container.

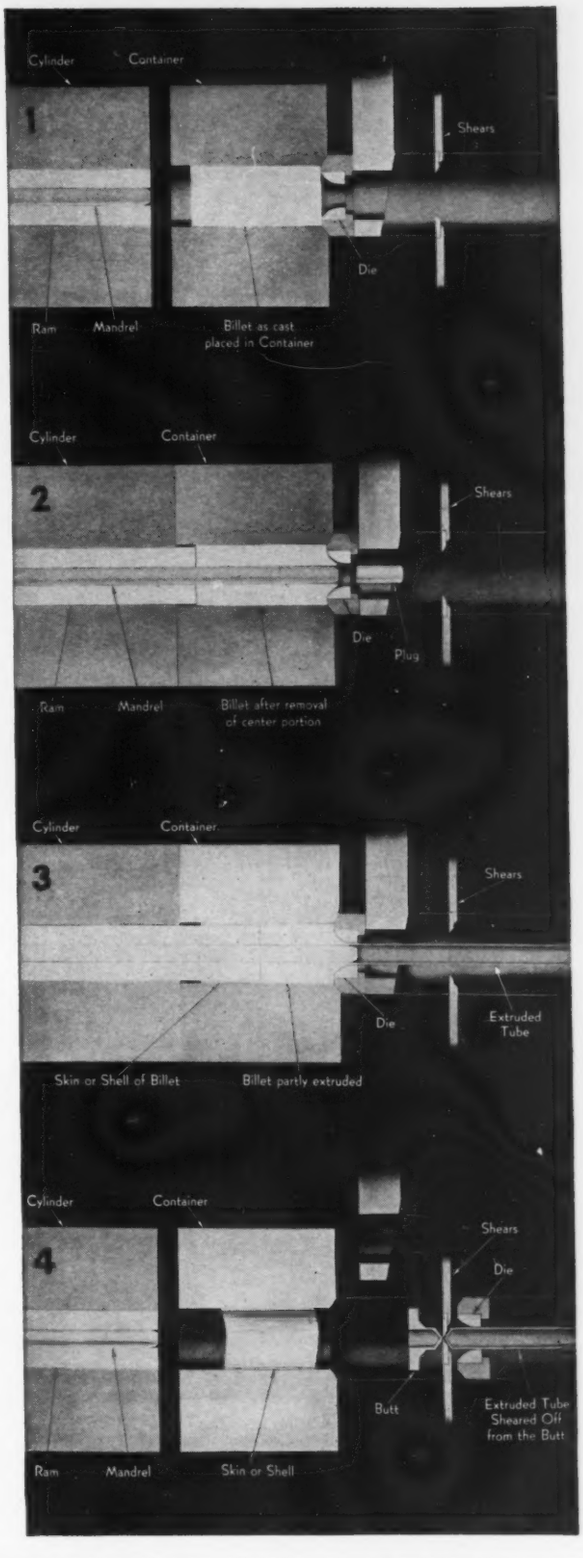
TUBE EXTRUSION PROCESS—NO. 4:
Extrusion is completed. The remaining short butt end of the billet is sawed off from the extruded tube.

TUBE FINISHING: Revere uses both the roll-forging method and the draw-bench method of tube reduction, depending on the alloy being processed. Following this operation, the tubes are heat treated to produce properties most suitable for the particular application planned. At each stage of production results are rigidly checked, and upon completion the tubes are carefully inspected.

TUBE ALLOYS: Revere Condenser Tubes are available in all modern materials, including Cupro-Nickel 70-30, Cupro-Nickel 80-20, Revalon (Aluminum Brass), Admiralty Metal, Herculoy (Silicon Bronze), 85-15 Brass, Muntz Metal, Phosphorized Copper and Arsenical Copper.

Revere Technical Advisory Service is organized to help you determine tube selections with due consideration to all factors involved.

* Information presented in this series of advertisements is taken from the Revere Condenser Tube Book. Contains much practical data of value to those interested in surface condenser and heat exchanger maintenance. For a copy of this book please write our Executive Offices, 230 Park Avenue, New York City.



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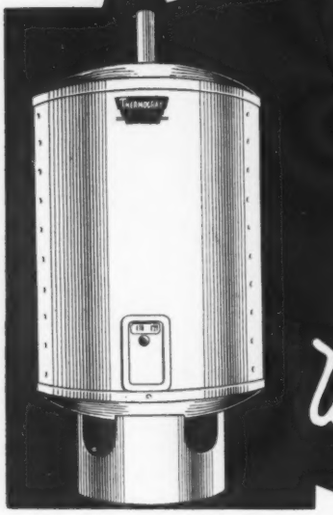
GET THERMOGRAY'S LOW PRICES ON LARGE OFF PEAK Water Heaters



This is the Type D heater that is popular with leading utilities needing large heaters at a low price. Designed for off-peak heating and available in 65 to 148 gallon sizes. Large diameter tank reduces radiation heat loss. Assembly completed on the job.

Completely satisfactory off peak water heating requires a simple, dependable heater of ample capacity to store the heated water. Big, thoroughly reliable Thermogray heaters do all the heating in one off peak operation. The special factory-built, scientifically designed, heavily insulated tanks KEEP the water hot until needed. Consequently, only one heating element, one thermostat and one set of controls are necessary. This not only assures consistent, trouble-free operation, but also keeps Thermogray prices low. If required, double elements and a variety of controls can be furnished for either off or on peak recovery. When you buy Thermogray heaters, you pay for factory-built quality and not elaborate and expensive promotion. For more than 8 years, leading utilities have found these big heaters completely satisfactory in every respect.

All Thermogray tanks larger than 30 gallons have elliptical ends for strength. After welding, each tank is given a high pressure water test and then galvanized.

THERMOGRAY HEATERS ARE FACTORY-BUILT THROUGHOUT

In order to give you a unit that has the finest balanced performance, Thermogray heaters are completely built—not just assembled—at our factory. The tanks are formed, welded and galvanized right in our plant. The outstanding Thermogray heating element is completely built at the factory. Every part is specially designed and built for these heaters. Only first quality materials are used. When you buy a Thermogray, you get the finest quality for less money. Write for free circulars.

THERMOGRAY COMPANY
309 W. McKINLEY STREET JEFFERSON, IOWA

Thermogray ELECTRIC WATER HEATERS

or business places, 8 per cent municipal power and 11.3 per cent combination. In making his recommendations, City Manager C. W. Koiner said there will be a slight reduction of less than 1 per cent for combination No. 3 rate for residential consumer, and combination No. 8 for the commercial consumer.

ILLINOIS COMMERCE COMMISSION has announced that annual reductions to consumers resulting from reduced rates during the month of June totalled $161,128. Of this total electric rate reductions amounted to $98,843. The commission's fiscal year just closed reveals that savings to consumers from rate reductions put in effect during this period were $5,104,327. This compares with the total reductions of $1,508,469 made during the previous fiscal year ended June 30, 1936. The first six months of 1937 indicates a total reduction amounting to $684,183.

CALIFORNIA-OREGON POWER COMPANY has announced rate reductions aggregating $103,500 a year and affecting 21,810 customers in Oregon. The reduction followed a series of investigations by the Oregon Public Utilities Commission.

LEXINGTON N. C. Light and Power Department has announced a reduction in light and power rates, amounting to 15 per cent.

NANTUCKET GAS & ELECTRIC COMPANY has been ordered by the Massachusetts Department of Public Utilities to reduce its charges for electricity to all-year domestic consumers by approximately $1,500 annually. A simplification of the rate structure was also recommended.

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Municipal Plants

STANBERRY, MO.—City has received the consent of the state supreme court to complete its municipal power plant. In an opinion written by Chief Justice Charles T. Hays, the court refused to force the Gentry County Circuit Court to grant the Missouri Service Company, now serving the city, an injunction against the city council. The utility sought a court order to restrain the council from fulfilling a contract for the purchase of equipment to complete the municipal plant.

SCOTTSBORO, ALA.—A municipal election to determine whether the city will use TVA power has been set for July 27, Mayor J. M. Woodall has announced.

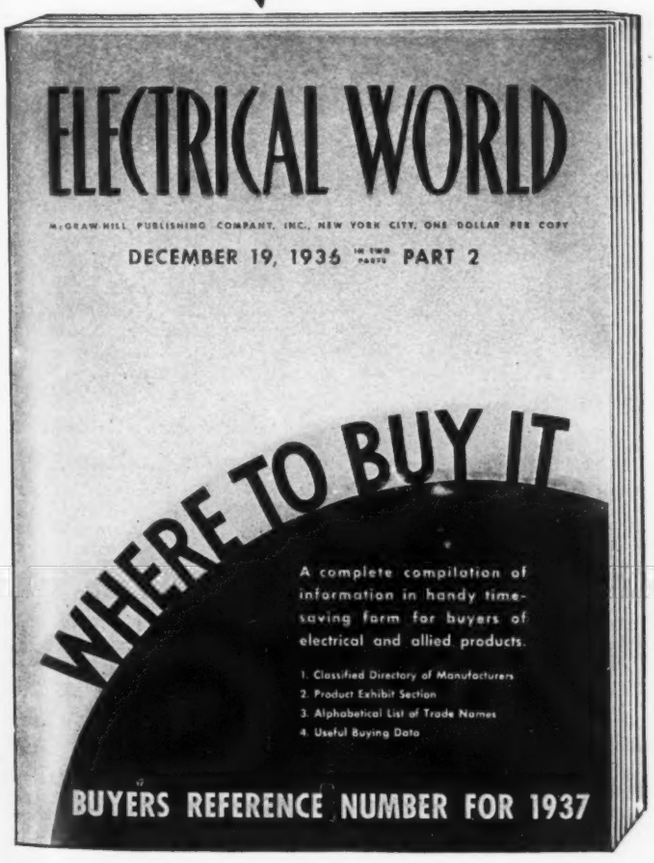
PORTSMOUTH, VA.—The dispute over the contract between the Virginia Electric & Power Company and the city (ELECTRICAL WORLD, July 3, page 108) is in the courts. J. P. Cherry has moved for an injunction against the contract ordinance with the result that Judge C. W. Coleman of the Portsmouth Circuit Court has set August 4-5 as time for hearing.

PLAIN, WIS.—The utility commission of the village has voted to sell its municipal electric utility to the Wisconsin Power & Light Company.

AUBURN, NEB.—Federal Judge Munger has entered an order temporarily enjoining E. B. Chappell, Fred W. Messmore and Wilmer W. Wilson, constituting a condemnation court, and the city officials from proceeding with the condemnation of the Western Public Service Company's plant. The judge thus upheld the plaintiff's allegations that the language on the ballot, which was submitted to the citizens last fall was ambiguous and did not conform with the resolution of the City Council placing the question on the ballot.

Who Makes It?

Look here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Sales Opportunities

MASON CITY, IOWA—Peoples Gas & Electric Company, Mason City, plans transmission and distributing lines in parts of Hancock, Cerro Gordo and Worth Counties, totaling about 71 miles, with outdoor power substations and service facilities. Permission has been secured. Cost about $85,000.

ELKHART, IND.—American Coating Mills, Inc., plans installation of motors and controls, conveyors, regulators and other equipment in new one-story addition to folding boxboard plant. Cost close to $100,000. Work will begin soon.

PONTIAC, MICH.—Pontiac Motor Division, General Motors Corporation, plans installation of motors and controls, regulators, conveyors, electric hoists and other equipment in new plant additions, totaling about 60,000 sq. ft. of floor space. Cost over $400,000.

KNOXVILLE, TENN.—Director of Purchases, Tennessee Valley Authority, Knoxville, receives bids until July 23 (postponed from July 15), for main power transformers, neutral grounding reactors and auto transformers for power plant at Pickwick Landing Dam, as per specifications on file.

LAKE ARTHUR, N. M.—Central Valley Rural Cooperative Electric Company, Lake Arthur, plans early construction of primary and secondary lines for rural electrification in parts of Chaves and Eddy Counties, totaling about 84 miles, with outdoor power substation and service facilities. A local steam-electric generating station will be built for power supply. Fund of $164,000 has been arranged through Federal aid.

DES MOINES, IOWA—Iowa Power & Light Company, Des Moines, has let general erection contract to Arthur H. Neumann & Brothers, Hubbell Building, for additions to steam-electric generating station on Carlisle Road. Installation will include a new 47,000-hp. turbo-generator unit and accessories, high-pressure boilers and auxiliary equipment. Work will be placed under way soon. Cost about $500,000.

KANSAS CITY, MO.—Sheffield Steel Corporation, Sheffield Station, plans installation of heavy duty motors and controls, transformers and accessories, conveyors, regulators, electric hoists, cranes and other equipment in new additions to mill, comprising several one and multi-story units, for which superstructures will begin soon. Cost over $1,500,000.

ZANESVILLE, OHIO—United States Engineer Office, Zanesville, receives bids until August 10 for one motor-driven pumping unit of 5000 gal. per min. capacity for Magnolia levee, and for one motor-driven pumping unit of 2000 gal. per min capacity for Sandyville levee, complete with motors and accessories, starting equipment, etc., as per specifications on file. At same time for gasoline engine-driven pumping units.

KALAMA, WASH.—Cowlitz County Public Utility District No. 1, Kalama, has plans for primary and secondary lines for rural electrification in part of Cowlitz County, totaling about 81 miles, with power substations and service facilities. Fund of $88,000 has been secured through Federal aid. Power supply will be secured from Puget Sound Power & Light Company.

SYRACUSE, N. Y.—Carrier Corporation, 850 Frelinghuysen Avenue, Newark, N. J. plans installation of motors and controls, conveyors, regulators, electric hoists and other equipment in new main plant for manufacture of air-conditioning systems and machinery at Syracuse, where company has acquired former property of Franklin Automobile Company. Existing buildings will be remodeled and modernized, and equipped for large capacity. Cost over $250,000.

SCOTTSBLUFF, NEB.—Western Public Service Company, Scottsbluff, plans new transmission line in Scottsbluff County, totaling about 25 miles. Permission has been secured.

THACKERVILLE, OKLA.—Red River Valley Rural Electric Company, Thackerville, W. C. High, president, plans primary and secondary lines for rural electrification in parts of Love County, approximating 160 miles, with outdoor power substation and service facilities. Cost about $170,000. Financing is being arranged through Federal aid. Proposed to ask bids soon. Power supply will be secured from Oklahoma Gas & Electric Company. E. T. Archer & Company, New England Building, Kansas City, Mo., is consulting engineer.

CUMBERLAND, MD.—Potomac Edison Company, Hagerstown, Md., has approved plans for new addition to power plant at Cumberland, for which steel frame superstructure will be placed under way soon. Additional equipment will be installed.

PECOS, TEX.—Red Bluff Water Power Control District, Pecos, E. B. Barron, president, has rejected bids recently received for construction of 25-mile transmission line and two power substations. New bids will be asked at early date. Vernon L. Sullivan is district engineer.

SAN FRANCISCO CALIF.—Field-Ernst Envelope Company, 45 Fremont Street, plans installation of motors and controls, conveyors, regulators and other equipment in new multi-story paper-converting plant at Fifth and Tehama Street, for which superstructure will begin soon. Cost about $130,000. Day & Michelsen, 405 Montgomery Street, are architects.

ATLANTA, GA.—Georgia Power Company has plans maturing for installation of underground conduit lines in a number of streets, and has secured permit for such improvement in Twelfth Street, between Broadway and Front Avenue. Company has approved appropriation of about $100,000 for underground line installations during present year.

TULSA, OKLA.—Tulsa Portland Cement Company, 1537 East Admiral Place, Tulsa, W. L. Harris, president, plans installation of motors and controls, conveyors, transformers and accessories, electric hoists, loaders and other equipment in new cement mill on site near city. A power house will be built. Cost estimated over $150,000.

LUMBERPORT, W. VA.—Harrison County Rural Electrification Association, Lumberport, care of E. V. Richardson, Lumberport, chairman, plans primary and secondary lines in parts of Harrison, Wetzel and Barbour Counties, totaling close to 200 miles, with outdoor power substations and service facilities. Fund of $211,000 has been secured through Federal aid. Bids are scheduled to be asked soon.

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50 Air-Conditioned Cars

An order for fifty air-conditioned coaches for the Canadian National Railways has been placed with the Canadian Car & Foundry Company. Construction will start at once and some of the cars will be in service this summer.